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MACHINE

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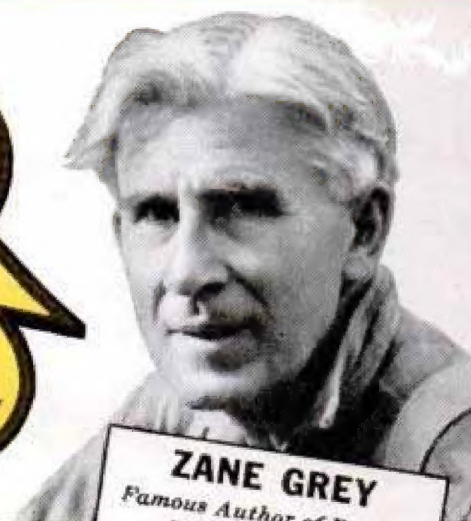
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# A TRUE STORY *BY* ZANE GREY

**HE WAS RIDING ON  
DYNAMITE AND  
NEVER KNEW IT UNTIL..**



**"This Close Shave," says  
Zane Grey, "Should Make  
Every Motorist Think Twice  
Before Gambling on Tires"**

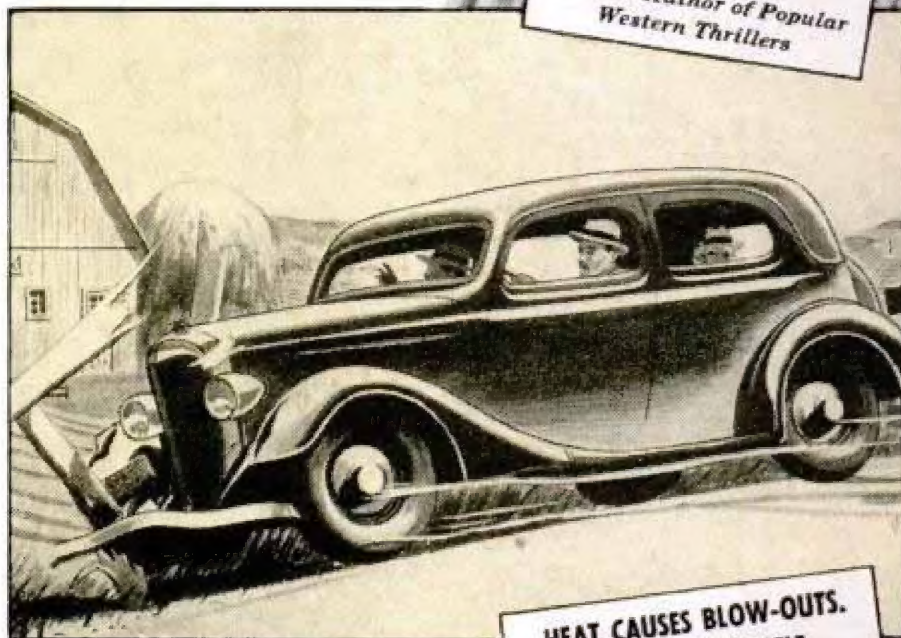
NOTHING suited Edward Zachary of Hartford, Connecticut, better than to open the throttle and "get away from it all." Not that he was a reckless driver. On the contrary, he was plenty strict when it came to observing traffic rules. But there is one motoring mishap that the best of drivers cannot forecast. And it caught Mr. Zachary completely off guard.

#### **BANG! Then What?**

He was whizzing along the Northford road at a good clip when BANG! Quicker than a Texas Ranger could draw a gun, the right front tire blew out. An uncontrollable drag yanked the car smack alongside of a guard-rail. Flying wheels mowed down fence posts. Seconds seemed hours before the wildest ride Mr. Zachary ever had came to a sudden halt.

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*special* rubber and full-floating cords, scientifically treated to resist the internal tire heat that causes many of today's high-speed blow-outs. By resisting this heat *inside* the tires, these Golden Ply Silvertowns give you, and everyone that rides with you, *real* protection against those dangerous high-speed blow-outs.

From now on you'll find Edward Zachary's car equipped with Silvertowns. For your own peace of mind - for the protection of your family and friends make *your next set of tires* Goodrich Golden Ply Silvertowns.

*Zane Grey*

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PROTECT YOURSELF  
AGAINST THOSE  
BLOW-OUTS WITH THIS  
HEAT-RESISTING  
GOLDEN PLY**



# Goodrich **SAFETY** Silvertown

**With Life-Saver Golden Ply Blow-Out Protection**



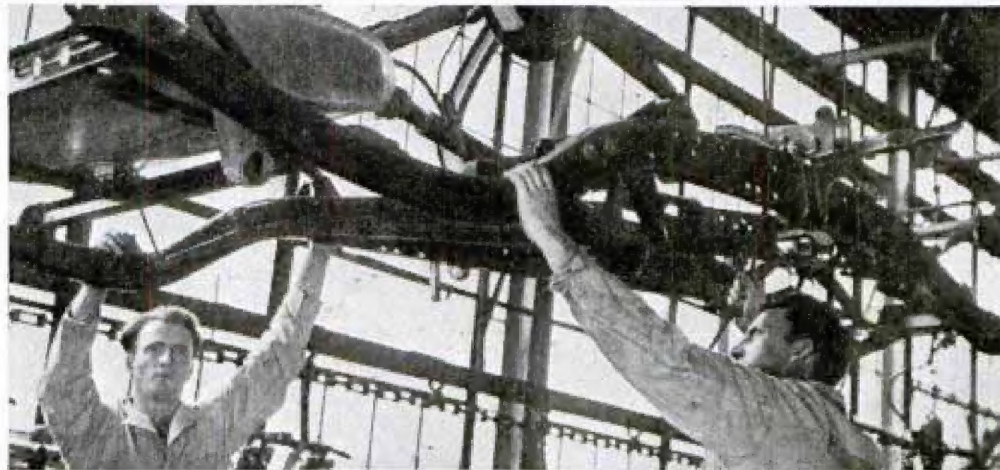
# VIBRATION BANISHED

## HOW ENGINEERS HAVE DONE IT IN MODERN CARS

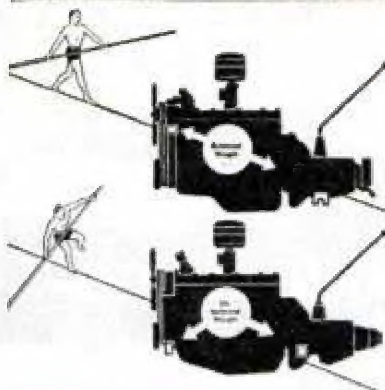
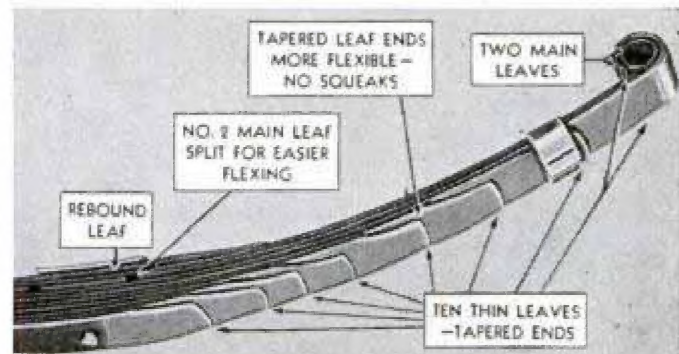
### Engine Vibration and Road Vibration—both now Shut Away from You

**D**O YOU KNOW how to pick the smoothest riding car?... Features shown on this page will help you. These developments also reduce the strain on the car...lengthen its life.

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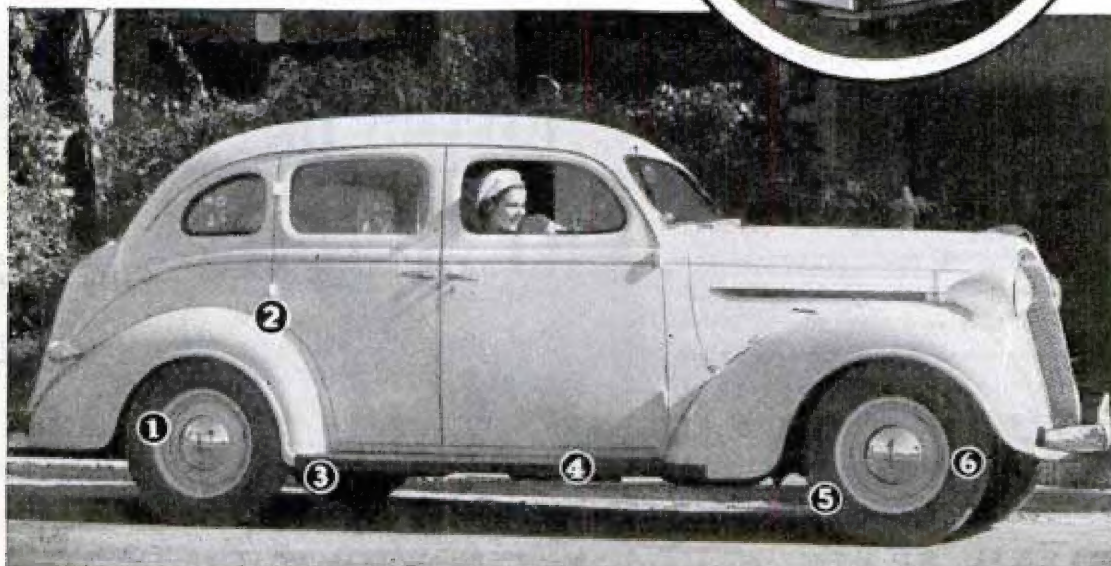
**SMOOTH RIDING—**Big airplane-type shock-absorbers absorb bumps, jolts, rumble and vibration...you ride comfortably.

**FLOATING POWER** mountings (upper left) suspend the big engine in perfect balance and eliminate vibration. (Lower left) Engine, without Floating Power, is unbalanced.



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# Popular Mechanics Magazine

H. H. WINDSOR, Founder

H. H. WINDSOR, Jr., Editor and Publisher

September, 1937

Vol. 68, No. 3

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## Invisible Clues!

**T**INY bits of evidence, too small for the unaided human eye to perceive, plainly mark the criminal's trail. So today's scientific criminologist examines his invisible clues to a murder or a kidnaping with the microscope or, if the accusing little links to crime are still smaller, with the compound microscope. With these, and other instruments from industrial laboratories, the modern detective examines dust particles, minute ridges on bullets, bits of metal, strands of hair and even the die marks on a small nail—then brands the suspect with his announcement of "guilty!" Almost as frequently his findings may be the means of clearing an innocent man. You'll want to read about the part science is playing in "Solving the Riddles of Crime," in the October issue.

## Next Month

**S**ECRETS of the Mayas, those aboriginal Americans who reached an advanced stage of cultural development 1,000 years before Columbus and then vanished, are being revealed. Digging into the ruins left behind by this lost race, modern explorers are piecing together the jigsaw puzzle slowly, marveling at what these ancients were able to accomplish. In next month's Coloroto section you'll find the story and eight pages of pictures in color, describing some of the Mayan wonders.

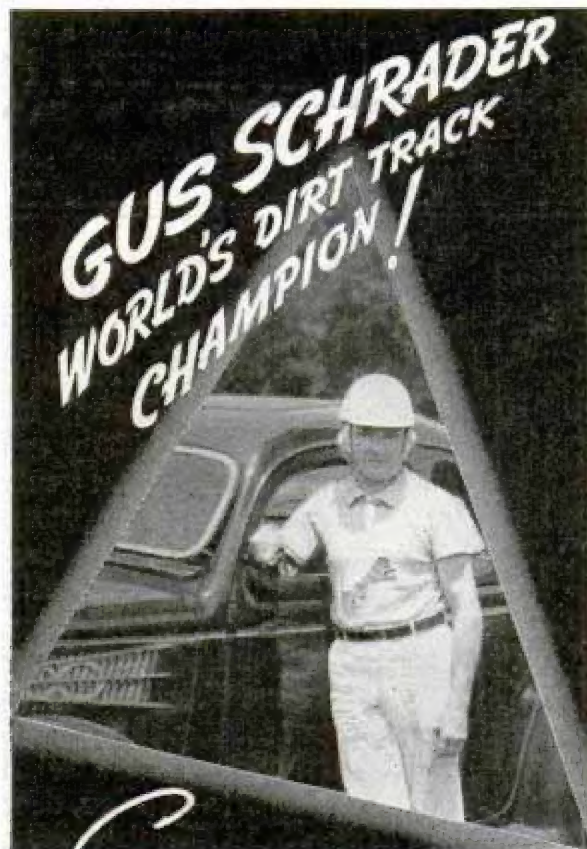
## Biggest "Eye"

**A**LMOST unbelievable are the vast distances of space which astronomers will be able to conquer with the 200-inch telescope atop Mt. Palomar. Scarcely less remarkable is the million-pound setting in which this giant "eye" will rest. Built like a watch, this massive steel base is truly an industrial masterpiece. The story will be in the October issue.

## Magic Lantern

**C**AST aside more than a generation ago, the stereopticon with its "still" pictures thrown on the screen is in big demand today. Complete with sound, the magic lantern entertains the family and friends and provides big business with a means of making sales talks interesting. Read about magic lantern "talkies" next month.





**"I Used Pyroil . . . My Motor Took More Abuse . . . Out-accelerated . . . Had More Power!"**

"I am writing you about my experiences in the past five months," says Gus Schrader, World's Dirt Track Auto Racing Champion. "Another driver and myself, driving the same make passenger cars, pulling trailers with race cars mounted on them, covered 18,000 miles giving 125 Traffic Safety Demonstrations in 125 different cities. I used Pyroil in my car. My motor took more abuse, out-accelerated the other car and had more power for mountain grades. When the motors were torn down, the rings in his car had blow-by. Mine had none. Other things being equal, Pyroil controlled this."

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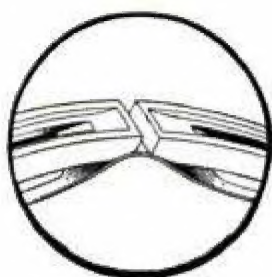
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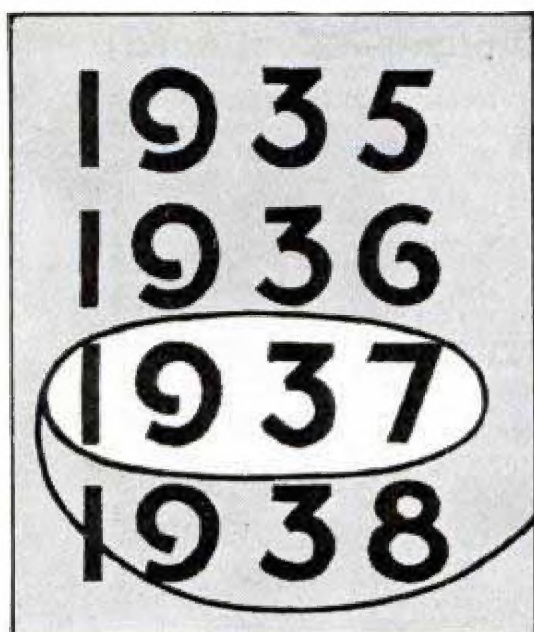
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GOOD TIMES UNTIL...**

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JUDY DOWN AND  
NOT GO TO HER  
PARTY

I'D GO  
FAST  
ENOUGH BUT  
I CAN'T DO  
ANYTHING.  
THEY CALL  
ME A DODO

WHEN I WAS A BOY THEY  
CALLED ME NAMES UNTIL  
I LEARNED HOW TO PLAY

THE HARMONICA.  
THEN I BECAME  
THE MOST  
POPULAR BOY  
IN TOWN

GOSH DAD—  
THAT'S AN  
IDEA

LATER

GEE DAD—THEY'RE SURE  
CRAZY ABOUT MY  
HARMONICA PLAYING—  
ASKED ME TO LEAD  
THE SCHOOL  
HARMONICA  
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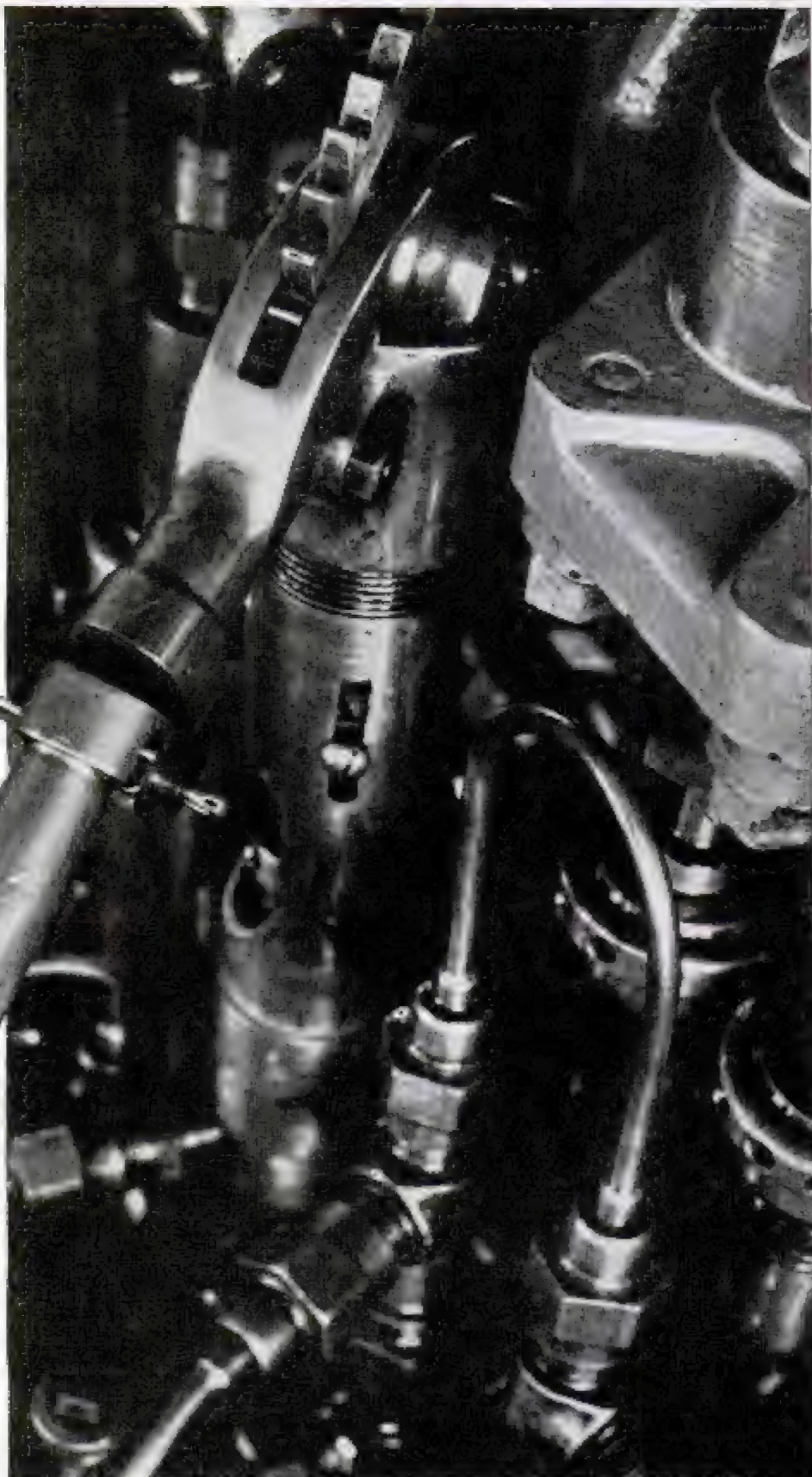
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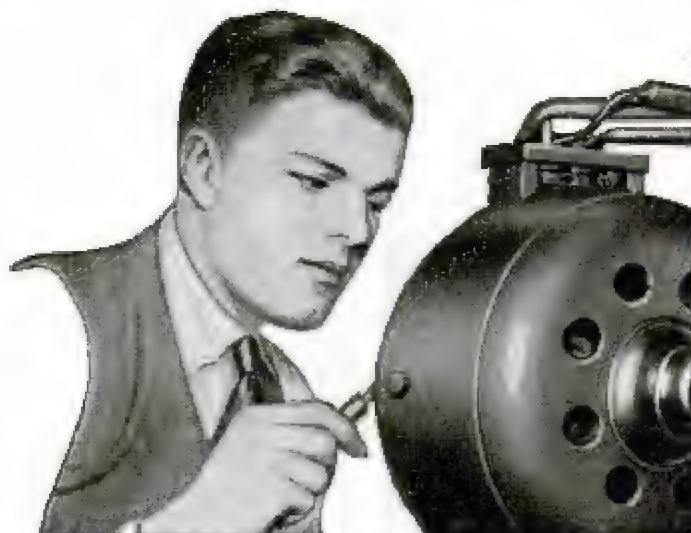
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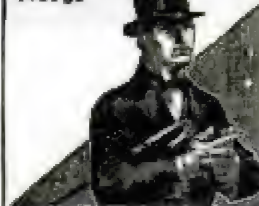
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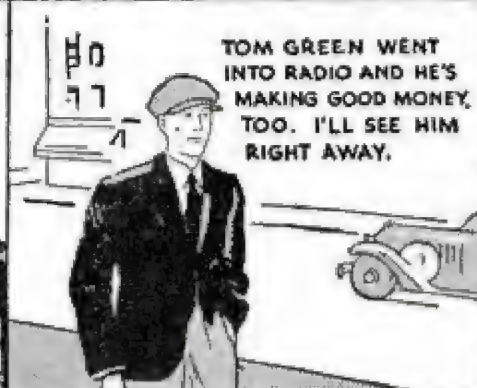
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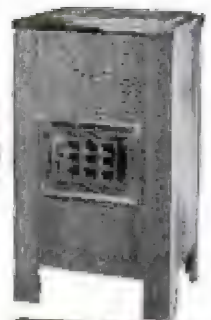
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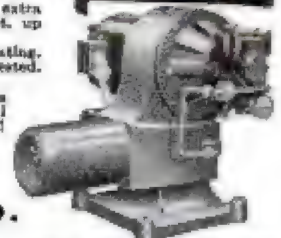
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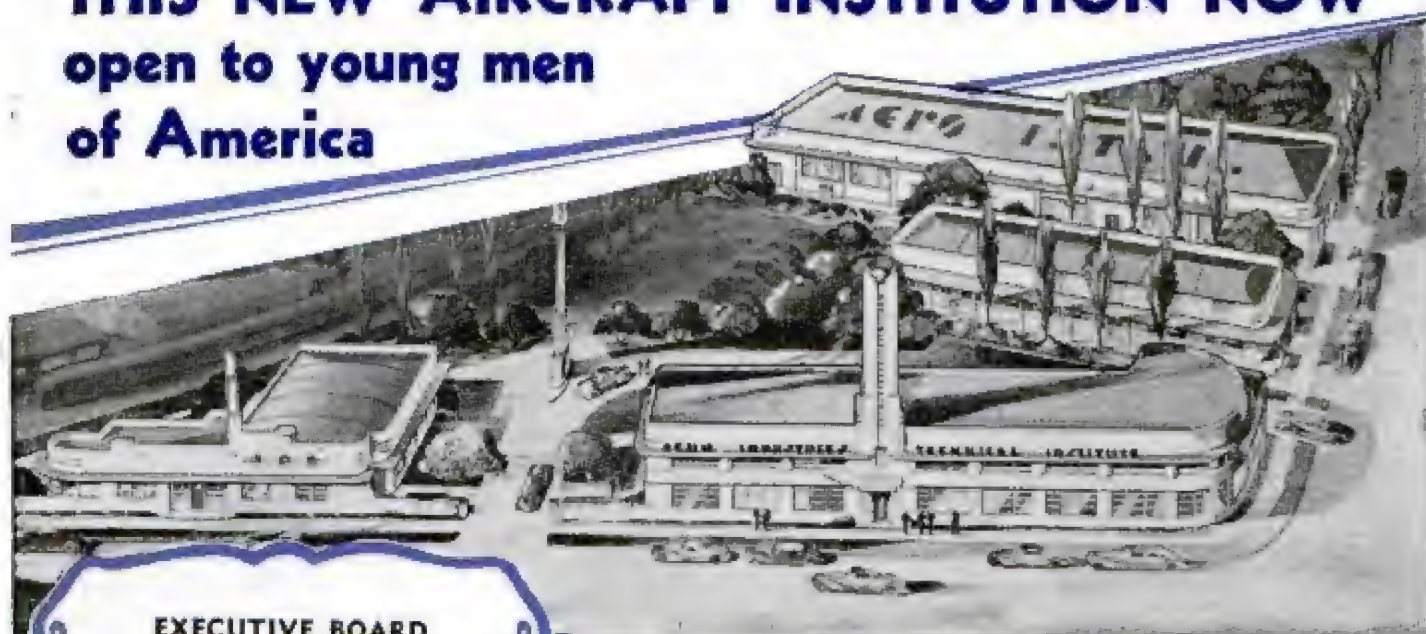
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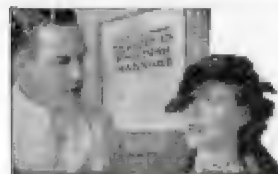
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Center group, Mozambique Company's pictorials. Left, two French Railroad Congress stamps and one Iceland commemorative of King Christian's reign. Bottom, three Danish issues of Christian's anniversary. Right, Dominican air mail; Aden Colony's first stamp and new Czechoslovakian issue

**S**HORTLY after the introduction of stamps, distinctive issues were brought out in various countries to prepay certain classes of mail matter such as newspapers and merchandise.

Austria leads in the first group, having issued newspaper stamps in 1851. Sardinia followed in 1861 and in the following year its stamps were replaced by those of Italy. In 1865 the United States brought out its large-size stamps inscribed "Periodicals," and within a few years France, Hungary, New Zealand, Portugal and some of its colonies, and Turkey joined the list. About thirty countries have experimented with this type of stamps, but all except five or six have discontinued their use.

The inscriptions on the stamps of the

United States and of New Zealand are in English, the former showing the words "Periodicals," or "Periodicals-Newspapers," and the latter, "Newspaper Postage." The word "journal" is used by several countries, appearing on the stamps of Brazil, Portugal and Azores, as "Jornaes," on those of France and Belgium, as "Journaux," to which in the case of Belgium is added the Flemish word "Dagbladen." In Italy and Sardinia it appears as "Giornale," and in Fiume as "Giornali." The word for printed matter or imprint is used in several countries, showing as "Impresos," in Cuba and the Philippines, as "Imprime," or "Imprimes," in Turkey, the latter form in Persia, and as "Prensa," in Uruguay.

(Continued to page 25A)



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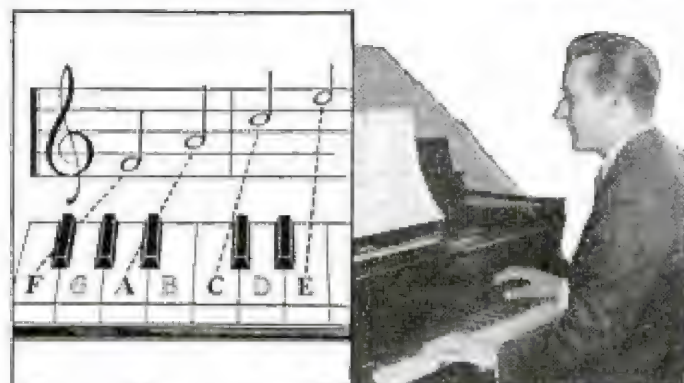
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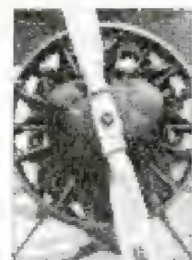
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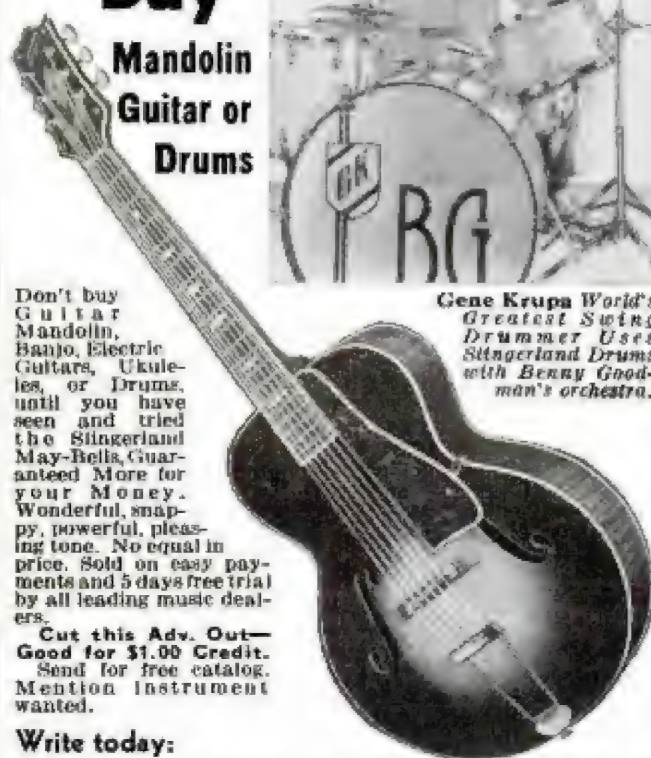
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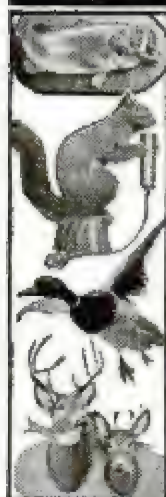
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(Continued from page 20A)

The word "Zeitungs" distinguishes the newspaper stamps of Austria, and "Avis-porto," those of Denmark. None of the newspaper stamps of Hungary, Mozambique, Cape Verde, and Serbia have inscriptions to explain their use, nor do the later issues of Austria, Bosnia, France, Algeria, Turkey, Poland, Czechoslovakia, and Fiume.

The second class of mail matter to receive special stamps was merchandise, generally known as fourth-class matter in the United States, but more recently classified by the authorities as "irregular mail." Stamps for such matter are called Parcel Post stamps and their use dates back to Belgium in 1879. Italy followed in 1884 and Congo in 1887. The United States used such stamps for a short time beginning in 1912, and was the eighth country in the list. Less than twenty countries have felt the need of such special stamps and very few use them today. The United States stamps have the inscription "Parcel Post," and this in Italy, the Italian colonies and San Marino, appears as "Pacchi Postali," but in Vatican City it is shortened to "Per Pacchi." French Morocco and Congo stamps have the words "Colis Postaux," and one issue of Belgium has "Colis Postal," although the general form is to show the words "Chemins de Fer," with the Flemish equivalent, "Spoorwegen." In Roumania the inscription is "Taxa de Factogin," or more recently "Factaj," in Salvador it is "Fardos Postales," in Peru "Porte de Conduccion," in Portugal, "Encomendas Postais," in Uruguay, "Encomiendas," or no inscription at all, and in Denmark, "Postfaerge." The Parcel post stamps of Afghanistan and Siam have no inscriptions in Latin characters, and those of Sweden show no inscription whatever relating to their use. A complete list of United States commemorative stamps issued since March 4, 1933, together with the names of designers and engravers is contained in a four-page mimeographed document lately released by the post-office department. Collectors may obtain a copy by writing to Harold F. Ambrose, chief of Information Service, Postoffice department, Washington, D. C.

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(Continued to page 31A)

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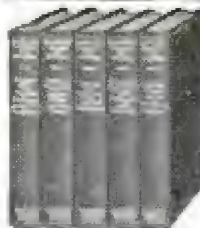
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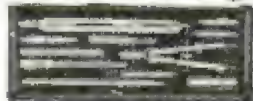
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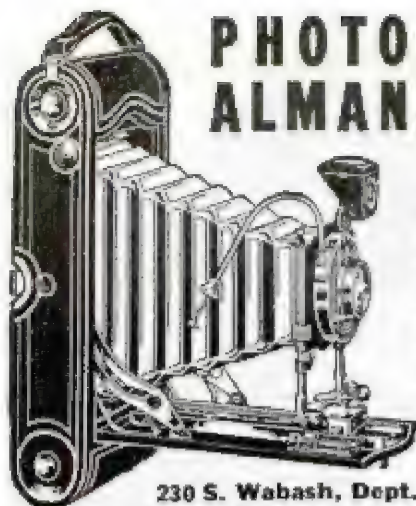
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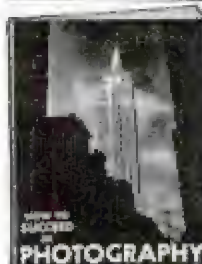


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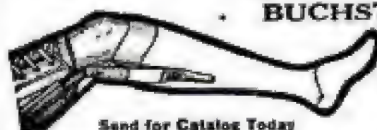
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(Continued from page 25A)

nance of 1787, under which the "Northwest Territory" was organized, was placed on sale at New York City, and at Marietta, Ohio, on July 13. The stamp shows an outline map of the original states and the "Northwest Territory," and contains small portraits of Manasseh Cutler and Rufus Putnam. New York City was selected for first-day sale as it was the capital of the federation of states in 1787. Marietta, Ohio, was the first settlement made under the authority of the federation, within the area which now embraces Ohio, Indiana, Michigan, Illinois and Wisconsin.

The first postal card used in the United States has recently been located. This issue was printed by the Morgan Envelope company, of Springfield, Mass., and a copy was mailed on May 12, 1873, by S. S. Burnstead, of Springfield, to Henry M. Burt, of the New England Homestead. It bears the message,—"This is the first postal card issued and sent through the United States mail." The card was found by Frank H. Burt, of Arlington, son of the recipient. Attached was a clipping stating that the first shipment of cards was forwarded to postmasters on May 12, 1873, and that the first card had been mailed as described.

### New Stamp Issues

New foreign stamps continue to roll off the presses in an unending stream. For this month's display several examples of the Mozambique Company's pictorial set have been selected. These are grouped at the center. The various designs of this issue picture animals, scenes, etc., of that Portuguese territory in East Africa. Two stamps at the left are a set issued by France to mark the 13th International Railroad Congress as well as the centenary of railroad operation in France. The 30c shows an electric locomotive while the 1F.50 pictures a modern streamline steam engine. At the extreme right is a new Dominican Republic air-mail stamp which pictures the airport of San Pedro de Macoris. Just below this stamp is an example of the first issue of the British colony of Aden. This shows a native sailing vessel known as a dhow. Aden is located on a small peninsula on the southern coast of

(Continued to page 34A)

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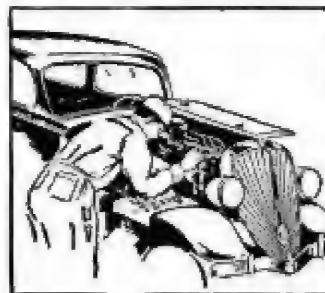
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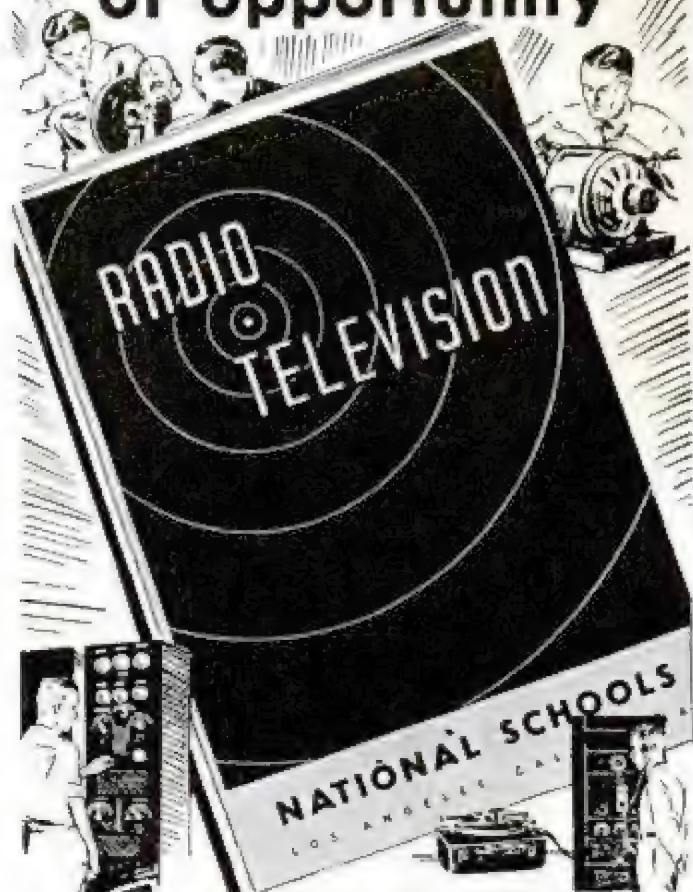
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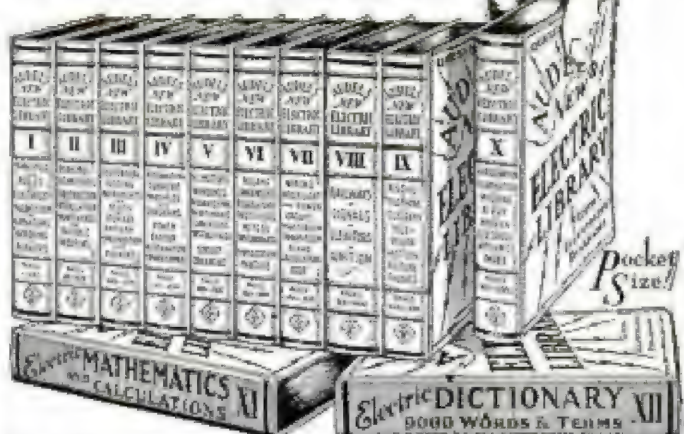
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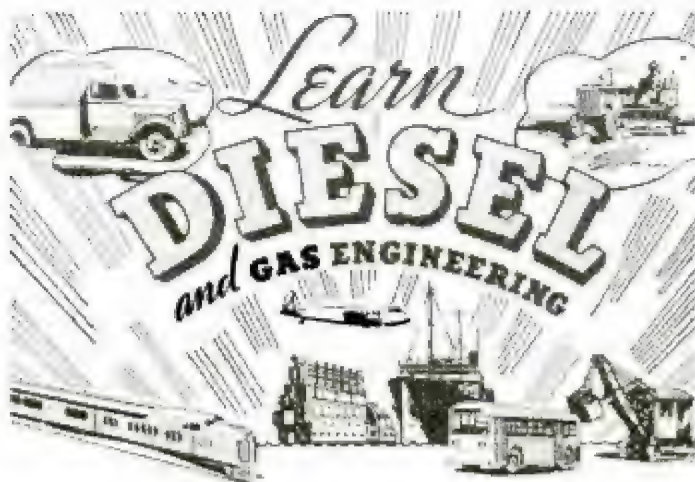
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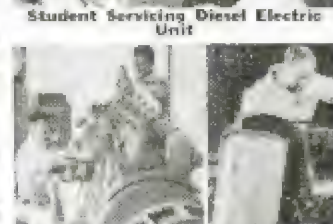
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(Continued from page 31A)

Arabia about 100 miles east of the entrance to the Red sea. The three central stamps in the bottom row show the three designs used in a set of four stamps issued by Denmark to commemorate the 25th year of the reign of Christian X. The stamp at the lower left corner is one of a set of three issued by Iceland, also to commemorate the 25th year of Christian X, for he is king of that sovereign state as well as of Denmark. At the lower right is a new Czechoslovakian issue which remains unidentified.

## Numismatic Terms

**Obverse, (Obv.)** The face of the coin, as the Lincoln bust on a cent. Commonly called "heads."

**Reverse, (Rev.)** The side opposite the obverse, as the buffalo side of the nickel. Commonly called "tails."

**Field.** The part not occupied by the device or inscription.

**Type.** As distinguished by the principal device. Thus nickels are "liberty head" or "Indian head," although the latter are commonly called "buffalo" nickels, and cents are "Indian head," or "Lincoln" depending upon the principal device.

**Symbol.** The secondary device, as the "fasces" on a dime.

**Legend.** The inscription.

**Motto.** An inscription such as "E Pluribus Unum," or "In God We Trust."

**Mint Mark.** Small letter or letters showing the branch mint. The chief mint at Philadelphia does not use a mint mark.

**Milled Edge.** The fluted or grooved edge of the coin. This term is often confused with other meanings of the word "milled," as, for example, the expression "Spanish milled dollar" is used to denote dollars which were coined in a mill, or coining press and not by hand hammering a die.

**Lettered Edge.** This term indicates that the edge of the coin bears lettering, either incised or raised.

**Plain Edge.** The edge of the coin, so defined, is without lettering, fluting, or any other form of marking.

**Bust.** This word indicates that a portrait shows the neck complete and at least a portion of the collar bone or shoulder.

**Head.** This word indicates that the portrait shows the head and a portion of the neck.



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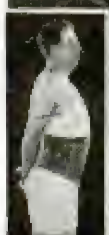
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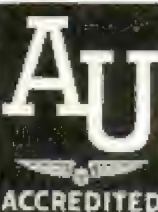
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**ICELESS** Ice; colder; cleaner; cheaper. Instructions, 25c. Duffy, Covington, Ky.

**FORMULAS**. Latest money makers. Literature free. Belfort, 4042 N. Keeler, Chicago.

**KAR-O-MEL**. Ten other popcorn formulas, including cheese, directions, etc. \$1. Dietz, Dept. B, Toledo, Ohio.

**ANALYSIS**. Research. Newest guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson Laboratory, Chemists, BD-1142 Sunnyside, Chicago.

**UNEXCELLED** Improved formulas, easily-manufactured, big-selling products, all lines. Write for unequalled special fail offers. Philharist Co., Jefferson City, Mo.

**MONEY** With boy's press! Printing four words! Instructions 25c. Carroll, 305 Francis, Connelville, Penna.

**CONCENTRATED** Food flavors in tubes. Almond, celery, wintergreen, lemon, peppermint, others. Agents' gold mine. Formula, instructions, \$1. W. Speck, Fairview, N. J.

### CHEMISTRY

**CHEMICAL** Units for experimental chemistry. 40 assorted units in a durable aluminum cabinet for \$2. Send for list of contents. Fales Units, Inc., 72 Gold St., New York City.

**JUST** Published. Chemical experiment booklet, 15c. Illustrated catalogue, 10c. Handbook for chemical experimenters, 50c. Reading Scientific Co., Reading, Penna.

**RUBBER** Latex. Dime brings literature, twenty experiments. Eastern Latex Labs., Box 53, Canton, Mass.

**CHEMICALS** In 5c quantities. Catalog 5c. Fletscher's Laboratories, Everett, Mass.

**FREE** Chemistry catalog. Supplies at 5c! Equip complete laboratory. Send 3c for postage. Kemkit Scientific Corp., 397P Bridge St., Brooklyn, N. Y.

**CHEMICALS**. Laboratory glassware, apparatus. Send 5c for catalog CP-1. Biological Supply Co., 1176 Mt. Hope Ave., Rochester, N. Y.

**ANALYSIS**. Research. Newest guaranteed formulas. Biggest catalog free. Special prices leads. Gibson Laboratory, Chemists, CT-1142 Sunnyside, Chicago.

### AGENTS WANTED

**BIG** Money and fast sales. Every owner buys gold initials for his auto. You charge \$1.50, make \$1.45. Ten orders daily easy. Write for particulars and free sample. American Monogram Co., Dept. 40, Dunellen, N. J.

**AGENTS**: Smash go prices. Santos coffee 12c lb., 4-oz. vanilla 8½c. Razor blades 10 for 8½c. 100 sticks chewing gum 12c. Christmas cards, 21 in box, 14c. 150 other bargains. Premiums. Experience unnecessary. Carnation Co., PO, St. Louis, Mo.

**MAKE** Your own products. Employ agents yourself. Toilet articles, soap, extracts. We furnish everything. Valuable book free. National Scientific Laboratories, 1960W Broad, Richmond, Va.

**AGENTS**—Opportunity to make money; book containing 107 successful business plans; home or office; send for free introductory booklet. Elite Co., 214 Grand St., New York.

**NEW** Brush plating outfits for auto parts, reflectors, etc., connect to a battery, no tanks used. Almost as simple as painting. Good income plating and silvering mirrors, low cost. Free proof. Gunmetal Co., Ave. H, Decatur, Ill.

**STRANGE** Ironing cord and stand: Save electricity. Abolish scorching and lifting. Can't kink or snarl. For telephones also. Big free offer. Sales guaranteed. Samples furnished. Neverknot, Dept. B-A, 4525 Ravenswood, Chicago.

**300% PROFIT** In new perfected (1937) quick action self-starting cigar lighter. No flint or friction. What makes it light? No wind can blow it out. Retail 50c. Costs you \$2 a dozen. Sample and sales plan 25c. New Method Co., New Method Bldg., Box PM-57, Bradford, Pa.

**BIG** Money applying gold initials on automobiles. Easiest thing today. Free samples. Also, sideline salesmen for name plates and tire cover transfers. "Ralco," 1305 Washington, Boston, Mass.

**SUCCEED** With your products. Make-sell them. Formulas, Processes, Accurate analyses. Catalog free. B. Thaxly Co., Washington, D. C.

**GENUINE** Gold letters for store windows. Easily applied. Free samples. Liberal offer to general agents. Metallic Letter Co., 438-B No. Clark, Chicago.

**DO** You want agents for your proposition? Your ad in this space will place your message before hundreds of men seeking fast-selling products. My folder "How to Secure Agents" is filled with proof. I'll gladly send you a copy free. P. W. Johnson, Manager Classified Advertising, Popular Mechanics Magazine, 200 E. Ontario St., Chicago.

**FREE** Sample—Amazing cleaner; sells homes, taverns, everywhere. Big profit—fast repeater. Betco, 5007 Irving Park, Chicago.

**MONEY** At home making flavors, lotions, shampoos, jellies, 68 products, materials furnished. Quality Co., E-20030 Russell, Detroit, Mich.

**YOU'LL** Like resilvering mirrors, auto-parts, reflectors, making chipped glass signs. Write, Sprinkle, Plater, 128, Marion, Ind.

**GENUINE** Remington portable typewriter for 10c a day! Men wanted to take orders for this remarkable bargain. M. N. Rand, Remington Rand, Inc., 315 Fourth Ave., Dept. J-50B, New York.

**NEW** Kind of heat boils water instantly. Make to \$30 daily. Pocket size minute demonstration. No installation. Free offer. No investment. Write the Lux Co., Dept. C-107, Elkhart, Ind.

**PAINTS** Wholesale—Flat white \$1.20 gallon; interior gloss white \$1.89; interior and exterior varnish \$1.49; white house paint \$1.49. Paint Shop, 138 Louis St., Grand Rapids, Mich.

**MAKE** Big profits in new kind wholesale business. No investment to start. Show merchants how to double profits and beat 5c-10c store competition by amazing new plan. Handle nationally advertised line 300 daily necessities, including Laymon's aspirin, approved by Good Housekeeping Bureau, advertised in Saturday Evening Post. Sold from flashing self-help counter displays in 5c-10c packages. Make up to 112% profit. Facts free. World's Products, Dept. 8810-A, Spencer, Ind.

**GOLD** Reflecting window sign letters. Penny each. Large sizes. Easily applied. New styles. Absolutely beautiful. Free samples. Atlas Sign Works, 7941 Halsted, Chicago, Ill.

**WANTED**—District purchasing agents. No experience or money required. Write Purchasing Manager, 174 N. Halsted, Chicago.

**CANVASSERS** Buy household products cheaper. Your own literature. Latest deals. Paty Co., Dept. B, Somerville, Mass.

**POWER-X**—Amazing new 35c auto power booster. Reduces carbon. Prevents overheating. 235% profit. Sells garages, gas stations. Staminite Corp., Dept. 87, New Haven, Conn.

**KANTFREEZE**, 8th Wonder. Makes radiators laugh at zero. Only anti-freeze in crystal form. Absolutely harmless. Every automobilist, prospect. Trial sample 25c. Kantfreeze Co., Sta. B, Cleveland, Ohio.

**LEATHER** Neckties—Big profits for salesmen. Look finer than silk. Cleaned with damp cloth. Always look new. All styles, colors. Sample tie and sales outfit 50c. Nu-Mode Ties, 1337-A N. 12th, Milwaukee, Wis.

**AGENTS** Are making money selling Lord's Prayer on a copper. Costs 2c, sells 10c. Particulars free. Sample 10c. Dave Markus, 8 E. Roosevelt Rd., Chicago, Ill.

**NEW** Book on foot relief. Sensational seller everywhere. Write Middleton Co., Box 694, Muncie, Ind.

**BIG** Money taking orders; shirts, ties, hosiery, underwear, raincoats, dresses, etc. Sales kit free! Experience unnecessary. Write Nimrod, Dept. 8, 4922-28 Lincoln Ave., Chicago.

**90c PROFIT** On \$1 sales. Cleaner for autos, metal and glass. Your name on labels. Free sample. Write, Instant Kleen Lab., Dept. E, Dayton, Ohio.

**MEN-Women**. Sell concentrated cleaning fluid. 25c package costs you 5c. Sample 10c. Literature free. Western, 6615 Denison Ave., Cleveland, Ohio.

**NEW** Soapless cleaning discovery! Amazing repeater. Enormous profits. Sales guaranteed. Free sample. Chicago Products, 3968 Avondale, Chicago.

**SELL** 8x10 Hand colored photographic enlargements, simulated leather framed. Sells for \$1.25. 50c cash commission. Get free particulars or deposit 50c for sample outfit. Economy Studios, 150 Nassau St., New York.

**AGENTS**—Up to \$32 in a week. Introduce amazing guaranteed hosiery service. Your hosiery free no extra cost, send size. Wilknit, Desk 9B37, Greenfield, Ohio.

**CHRISTMAS** Cards—50 beautiful folders, name imprinted, cost 65c, sell for \$1. Marvelous 21-folder assortments sell for 60c and \$1, pay you 100% profit. Be first with this great new 1937 line! Extra bonuses for early sales. Samples free. Start now! New England Art Publishers, North Abington, 236, Mass.

**FREE** Sample, Wonder cleaning compound, big profits. Sales to homes, restaurants, taverns, everywhere. Henri, M5, LaGrange, Ill.

**PATENTED** Gillette sharpener. Instant demonstration. Sample with leather strap 50c postpaid. Mercer, 101 W. 78 St., New York.

**500% PROFIT!** Gold reflecting letters for store windows. Large sizes 1c. Free samples. Modernistic Sign, B-3004 Lincoln Ave., Chicago.

**FREE**—Complete \$4 sample outfit. You don't pay a nickel now or later. Big profit medicines, cosmetics, extracts. Write Collins, Dept. PM-8, Memphis, Tenn.

**SEMI-AUTOMATIC** Black walnut cracker, 50 lbs. kernels daily, \$10 prepaid. Money back guarantee. Pecan machine, cracks accurately, \$3 prepaid. Agents, good profit. Clark Nut Cracker, Harrisburg, Penna.

**CALENDARS** And Christmas cards. Extensive lines. Singer Co., 651 Twentieth St., Oakland, Calif.

**CHRISTMAS** Cards. Absolutely finest assortment. Big profits. Write for samples. Robinson Cards, 300 Orange, Clinton, Mass.

**450% PROFIT** Quick-Action automatic gas lighter. No flint. 25c seller to every home, office and restaurant. Free sample. New Method Co., Box PMQ-57, Bradford, Penna.

**SELLS** Like hot cakes, big profits, new type men's Metalastic Sport Belt. Full particulars and two samples, enough to get orders with, \$1. Metalastic Belt Co., 210 Taaffe Pl., Brooklyn, N. Y.

**LORD'S** Prayer engraved on penny. Sample 10c. Barrington Sales, Barrington, N. J.

**PORTRAIT** Agents including foreign countries. Lowest prices portraits, frames. Catalog free. Picture Man Friedman, Dept. 9, 523 Cornelia, Chicago, Ill.

**GUARANTEED**. Latest, automatic pipe wrench. Simple, quick adjusting. Wonderful sales opportunity. Write, Be first, Stanley Bauman, Sassamansville, Penna.

**CASH** in on amazing demand for new unique car washer. Every auto owner, service station, fleet owner wants one or more. Slight sells. Demonstration unnecessary. BBCo, Box 418, Gainesville, Tex.

**SELL** Power spray gun equal to \$25 outfit for \$5.80. Over 100% profit. Paints autos, houses, furniture, etc. Auto Spray Co., Compton, Calif.

**500% PROFIT** Selling new 20-in-1 kitchen utensil. Retail 25c. Costs you \$1 a dozen or \$7.20 a gross. Sample 10c. New Method Co., PMM-57, Bradford, Penna.

**DURA-GLIT** Magic Wadding cleans all metals economically, effectively. Quick demonstrator. Your own literature. Retail 35c. Samples 10c. Full sized can and sample 25c postpaid. Generous discounts. Rochester Manufacturing Co., Rochester, N. Y. Canada, Brian G. Pearce Limited, Toronto.

**PROFITABLE** Home business. Legitimate. No canvassing. Maywood Publishers, P-923 Broadway, New York.

**MANUFACTURE** Specialties, hire agents yourself. Big money. Free literature. Gilbert Supply, 1107-P Broadway, New York.

**MONOGRAMMING** Automobiles biggest money maker today. New type requiring no varnish to apply. Write for samples. International Monogram & Transfer Co., Box 9360, Philadelphia, Penna.

**MEXICAN** Hand-made leather pictures leave enormous profits. Size 4x9", retail \$1, costs you \$2.64 a dozen including duty. Christmas cards postal size retail 20c, cost only 6c. Free particulars. Both samples 30c stamps. Marquez, Apartado 1176-P, Mexico City, Mexico.



**ENGRAVED** Name plates, numbers, signs, etc., easily sold, profits large. Brett Bros., Winthrop, Mass.

**NEW** Electric vaporizer, marvelous help for relieving colds, hay fever, asthma; other uses. Needed in every home. Low-priced. Fast-selling. Good profits. Write Savaco, 906 Main St., Cincinnati, Ohio.

**MAKE** Extra money spare time showing my "Exclusive Selections" \$1 assortment of Christmas folders. You make 50c a box. Seven other Christmas bargains. Engraved holiday stationery, 50c. Gift wrappings. Write free samples. Schwer, Dept. 39, Westfield, Mass.

**CHRISTMAS** Cards. Quick cash profits. Sell 1937's master creations in personal cards and stationery. 7 double value boxes assorted cards. New low prices. Experience unnecessary. Samples free. Wallace Brown, 225 Fifth Ave., Dept. 210, New York.

**CHRISTMAS** Card bargains. Sell 50 personal Christmas cards for \$1. All beautiful folders with customer's name inscribed. Liberal profit. Free samples. Also marvelous value \$1 box assortments. General Card, 400 S. Peoria St., Dept. F-55, Chicago.

**100% PROFIT.** Free sample with plans, process, label. Product sells local or mail. Other valuable formulas. Circulars mailed 30c 100. Instant Klean Lab., Dayton, Ohio.

**OVER 100%** Profit selling glove and muffler, tie and handkerchief, hose and tie sets. Many other novelties. Write for catalog of 42 money makers and free sample swatches. Boulevard Cravats, 22 W. 21st St., Dept. M-48, New York.

**AUTHORIZING** Exclusive representations revolutionary faucet water softener. Luxean, Sausalito, Calif.

**THYDRO-X** (Extra miles). Fast seller. Up to 500% profit. A million dollar market. Trial offer free. Thermo-P Works, Peoria, Ill.

**PROFIT** With new products. Make, sell, repeat. Analysis. Research. Guaranteed formulas. Biggest catalog free. Special prices, leads. Gibson Laboratory, Chemists, ED-1142 Sunnyside, Chicago.

**MAKE** Big money with amazing new line pants, shirts, jackets, sweaters. Smashing low prices. Cash in advance commissions, in addition earn extra cash bonuses and free garments. No investment. Complete sample line free. Rush name and address. Dunlapants, Dept. J-17, Cincinnati, Ohio.

**AGENTS** Make \$65 a week easy selling our line. Gordon Products, 3815 1/2 Indiana Ave., Chicago, Ill.

**AGENTS:** Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

**SELL "Ty-Nect"** ties. Newest sensation in four-in-hand ties. Has patented pretied knot! Irwin Huether, 115 Nixon St., Cincinnati, Ohio.

**AGENTS** Make \$5000 a year! New low priced fire alarm that sells on sight! No wiring needed. Every home and farm needs from 1 to 6. Biggest money maker of all time. Write for details today! The Muter Co., Dept. PC, 1255 S. Michigan Ave., Chicago, Ill.

**SELL** The Driving Master. Shows miles per gallon when driving. Analyzes motor. Described page 369 September, 1936. Popular Mechanics. Driving Master Co., Sioux City, Iowa.

#### HIGH-GRADE SALESMEN

**SALESMEN:** Sell advertising novelties, calendars, fans, thermometers, etc., for nationally known firm. Liberal commissions. Stanwood Hillson Corp., 21 Station St., Brookline, Mass.

**SALESMEN—Four** \$15 sales to stores net you \$40 daily. Sayers Systems, Est. 1895. 2801-123 Sheffield Ave., Chicago, Ill.

**BRUSH** Salesman—If you ever sold brushes write for our money making proposition. Donald Brush Co., Camden, N. J.

**NEW Specialty**—Sells every business and professional man. Four \$15 sales daily pay \$280 weekly. Ferrell cleared over \$1,000 monthly. Write, F. E. Armstrong, President, Dept. PM, Mobile, Ala.

**SELL** Nothing! \$95 weekly. \$500,000 punchboard firm announces new, no investment plan. Season starting. K&S, Dept. C129, 4323 Ravenswood, Chicago.

**IMMEDIATE** Openings for ambitious men! Wear, introduce "Fairbanks" tailored-to-measure clothes, make up to \$10 in a day. Experience unnecessary. Bonus suit offer. Low prices. Quick sales. Free outfit. Permanent! Fairbanks Co., 2306-A Wabansia, Chicago.

**FREE** Booklet describes 107 plans for making \$20-\$100 weekly, in home or office, business of your own. Elite Co., 214 Grand St., New York.

**YOUR** Own business! Become a subscription representative for "Popular Mechanics." No capital needed. Liberal commissions. Monthly bonus. Write for details. Circulation Department, 200 E. Ontario St., Room 402, Chicago.

**REMINGTON** Rand will employ local representatives for portable typewriter division. No experience or investment. Unusual opportunity for reliable man. Write M. N. Rand, 315 Fourth Ave., Dept. J-50A, New York.

**JUST** Out. New invention sells fast to service stations, garages. 4 easy sales daily makes \$75 weekly. Hurry! Vernon Co., Newton, Iowa.

**MAKE** Big profits in new kind wholesale business. No investment to start. Show merchants how to double profits and beat 5c-10c store competition by amazing new plan. Handle nationally advertised line 200 daily necessities, including Layman's aspirin, approved by Good Housekeeping Bureau, advertised in Saturday Evening Post. Sold from flashing self-help counter displays in 5c-10c packages. Make up to 112% profit. Facts free. World's Products, Dept. 9810-B, Spencer, Ind.

**SPARKLING** Glo-Brite signs sell fast to stores, restaurants, taverns. Lasting gold finish. Plenty profit. J. A. Baxter, Cambridge, Ohio.

**BIG** Commissions selling stores celluloid pricing tickets, metal shelf moulding, menu covers, signs, chrome changeable letters. P. Pricing Press, 124 White St., New York.

**NEW** Punchboard assortments. Free large colored catalog. Nothing to carry. Larger cash commissions daily. Season now! Addwill Sales Co., 180 Adams, Chicago.

**EARN** Big commissions daily; cash bonuses regularly. Sell genuine Truhenized Starchless-Collar Shirts guaranteed one full year. All season's newest styles. Ties, socks, underwear, also. Expensive new sample outfit free. Write today. Dept. F9, Quaker, Broadway at 31st St., New York.

**NO** Competition. New automatic safety lamp for automobiles and trucks. Light automatically goes on when headlights fail. Prevents accidents. Just going on market. Territories being allotted. Nationally established price \$7.50. Salesman's sample \$4.95. Get busy demonstrating and cashing in. Automatic Safety Lamp Co., Waco, Tex.

**BIG** Money taking orders; shirts, ties, hosiery, underwear, raincoats, dresses, etc. Sales kit free! Experience unnecessary. Write Nimrod, Dept. 65, 4922-28 Lincoln Ave., Chicago.

**SELL** Quality business cards \$1-1,000. Your profit 25c. Samples free. Dixie, 3706 Florida, Tampa, Fla.

**MAN** Wanted to supply Rawleigh's household products to consumers. We train and help you. Good profits for hustlers. No experience necessary. Pleasant, profitable, dignified work. Write today. Rawleigh Co., Dept. I-53-PPM, Freeport, Ill.

**SALESMEN.** Distributors, new deal, more profit. Exclusive territory. 125 varieties brushes, mops, specialties. Neway Brush Co., Hartford, Conn.

**CASH** in on amazing demand for new unique car washer. Every auto owner, service station, fleet owner wants one or more. Sight sells. Demonstration unnecessary. BECO, Box 416, Gainesville, Tex.

**SALARY** And bonus offered salesmen after proving ability, selling business men. Small investment, returnable. Non-competitive product. Engineer, Box 1814, Tampa, Fla.

**STATE** Representative wanted. New and different. Six numbers. Every one a fast seller. Be able to carry stock. \$1 deposit for sample returnable. 5870 Hollywood Blvd., Hollywood, Calif.

**SALESMEN** Make big profits selling brand new metal 7 col. pocket calculator. Retail \$2. No competition; exclusive territory. Lightning Calculator Co., Grand Rapids, Mich.

**MAKE \$2000** By Christmas. New greeting novelty. Free samples. National Sales Agency, Box 446, Gainesville, Fla.

**A KNOCK** Out for specialty salesmen. Only one of its kind in the world. Fountain pen with everlasting blotter, and pencils, advertising pencils to retailers and premium users. Send 50c sample and catalog. Hartline Pen Co., 407 W. Fortune, Tampa, Fla.

**ADVERTISING** Book match factory offers you amazing opp. We are largest in world selling direct. Big cash comm., bonuses. Full-part time. Big repeats. Samples and kit free. Match Corp. of America, Dept. E-9, 6041 Grand, Chicago.

**BE** Your own boss. Make the largest commissions selling our complete line of brushes. Write for sales plan. Wire Grip Sanitary Brush Corp., 220 Southern Boulevard, New York.

**THERMOCAST** One kw immersion electric water heaters quickly heat any liquid. Shockproof, easily cleaned. Details. Packideas, Box 1168, Los Angeles, Calif.

**FREE** Suits, pants, o'coats. Given as bonus besides large cash profits, premiums and gifts. Sell only (4) suits to get a free suit. No limit to number of free garments you may earn. Wholesale prices \$16.95 and up. Sample line free. No experience needed to make easy sales. All garments individually cut and tailored to measure. Satisfaction or money back guarantee. Three Star Clothes, Inc., 330 N. Franklin St., Dept. L-2, Chicago, Ill.

**FREE** Sample, article sells \$1, costs 20c. Drawer 580, Bowling Green, Ky.

**IMAGINE** Going into stores, gas stations, etc., empty-handed and coming out with money in your pocket. New, powerful progressive sales stimulator. Merchants going for it. Fast, advance cash commission getter. Automatically repeats. Sales outfit free. Meinhardt, Dept. A-7, 18 E. Kinzie, Chicago.

**SALESMEN—Welders** and supplies. Hercules Products Co., 325 Roebling St., Brooklyn, N. Y.

**"GRIP** Point," patented screwdriver locks into screw slot. Everybody needs one. Write for proposition. Large commissions. Send 50c for sample. Stromberg Motorcycle, 2703 Belmont, Chicago.

**SALESMEN** Selling \$400 weekly advertising pencils. Send 25c sample. Hartline, Tampa, Fla.

#### HELP WANTED

**USE \$500?** Raise canaries for us. Splendid sparetime money maker, fascinating work. We supply singers and buy back. Write for free particulars. Crimmins, Box 44B, Woodside, N. Y.

**MODERN** Refrigeration. New industry needs trained men for installing, servicing, repairing. If you seek a new field with larger opportunities get latest book by Alt-house and Turnquist. \$5 postpaid. Popular Mechanics Press, Room (C37), 200 E. Ontario St., Chicago.

#### EDUCATIONAL AND INSTRUCTION

**LEARN** Machinist trade, tool, die making. Automatic and hand screw machines. Modern shop methods. Actual work. Jobs open for trained men. Employment help. Illustrated booklet free. Allied Screw Machine Co., 601 Lake St., Chicago.

**KNOCK 'Em** cold. Learn police Jiu Jitsu. 13 secret knockout blows without fists. Illustrated course by world famous instructor. Price 15 cents. S. J. Jorgensen, 406 Maritime Bldg., Seattle, Wash.

**HOME** Study engineering courses leading to degrees. Mechanical; electrical; Diesel; civil; aeronautical; automotive; chemical; radio and others. McKinley College of Engineering, Chicago.

**BECOME** An investigator—Secret service agent. New "Test Problem Method." Develops your ability. Particulars free. International Secret Service Institute, (PM97), Hoboken, N. J.

**GET \$50** To \$87.50 every pay day on Uncle Sam's payroll. Many appointments expected soon. Our coaching helps qualify you for Social Security, liquor gauger, meat inspector, office clerk, stenographer, typist, customs, postal and many other positions. Write today for free book, list of positions, etc. Patterson School, (Arthur R. Patterson, former Government examiner, Principal), 8 Case Bldg., Rochester, N. Y.



**MAKE More money.** Get a U. S. government job. Get our new plan for obtaining one—no obligation. Age 18-50. Write Instruction Service, 101, St. Louis, Mo., immediately.

**BECOME** Business investigator. Make money in your spare time. Pleasant work, good fees. Details free. Business Detective System, 1009 Oak, Elmira, N. Y.

**\$103-\$175 MONTH.** Get a government job. Men, women. Try next examinations. List jobs and sample coaching, free. Franklin Institute, Dept. G3, Rochester, N. Y.

**MILWAUKEE** Industries desire to contact earnest men to learn electric arc welding in their laboratories of the School of Engineering. Moderate training fee. For details write President Werwath, 1020-26 N. Broadway, Milwaukee, Wis.

**EARN** Doctor's degree, psychology, science, philosophy—General courses, engineering, law, etc. Send for free bulletin. No obligation. Temple Bar College, Missoula, Mont.

**BLUEPRINT** Reading taught by mail. Write Blueprint Reading Institute, Box 5662, Metropolitan Sta., Los Angeles.

**LEARN** Auto mechanics, body, repairing, welding, electricity, refrigeration, Diesel. Stevenson's, 2008A Main, Kansas City, Mo.

**BIG** Bargain catalogue educational matter 10c. Handling, Y-799 Broadway, New York.

**STAMMERING** Corrected. Home instruction. Machon, 3063 W. Pico, Los Angeles.

**SECRET** Investigations. Excellent opportunity. Particulars free. Write George Wagner, M-2640 Broadway, New York.

**AIR** Conditioning, electric refrigeration industries demand trained men for installation, service, maintenance and sales. Qualify in 3 months. Free employment service. Established 34 years. Get new book "Step Up to Success" free. Write O. Werwath, President, 1020-26 N. Broadway, Milwaukee, Wis.

**PHOTO-COLOR**—Learn at home. Easy method. Make money. Complete course only \$1. W. Greener, St. Johns, Mich.

**ALERT** Men! Learn refrigeration. Easy 30 lesson refrigerator repair course \$2.95 postpaid. Thermometer included for promptness. William's Institute, 3941 Shaker Square Station, Cleveland, Ohio.

**IF** You like to draw, sketch or paint, write for Talent Test. No fee. Give age and occupation. Federal Schools, Inc., Dept. P97, Minneapolis, Minn.

**SHORTHAND** Simplified, complete \$1 folder-lesson 10c. Simmons, Rocky Hill, Conn.

**HOMESTUDY.** Trimester doctor course. Earn while learning. Collegium, S-Whitley, Ind.

**LEARN** Lettering \$1 complete course. Northeastern School of Lettering, Bangor, Maine.

**COMPLETE** Civil service training! Write for free self-survey questionnaire. Lincoln Institute, 10 Tremont St., Boston, Mass.

**ELECTRIC** Welding taught by experts. Established 1918. Welding Co., 4100 Paul St., Philadelphia, Penna.

**MASSAGE.** Hydrotherapy, dietetics, drugless therapeutics, chiropody, taught by mail. Evans Correspondence School, Montgomery, Ala.

**OBTAIN.** Use Divine Power of God! Send for free lecture. What Is Psychic Creation. No obligation. F. Guderian, Director, Yakima, Wash.

**PREVENT** Check forgery! Fascinating illustrated booklet 10c. Protection Society, Oklahoma City, Okla.

**LEARN** Air conditioning—America's next big industry. Thousands of opportunities. Get your start with complete book by E. W. Riesbeck. \$3.50 postpaid. Popular Mechanics Press, Room (C37), 200 E. Ontario St., Chicago.

**CARTOONING, COMMERCIAL ART, SHOWCARD WRITING, SIGN PAINTING**

**AMATEUR** Cartoonists—Win \$25. No drawing ability necessary to win. 26 prizes in all. Rush name on postcard for valuable tips on "How to Make Money With Simple Cartoons," cash prize entry blank and rules. Send no money. Cartoonists' Exchange, Dept. C-99-A, Pleasant Hill, Ohio.

**CARTOONING** Course. Thirty illustrated lessons, over 500 drawings, pens and pencils, \$1 complete, postpaid. Scovell Studios, Box 748-P, Hollywood, Calif.

**SIGN** Painters make big money. Why not you? Simple, easy to learn. Signs are used everywhere. Circulars for stamp. The Russ-Well Institute, Box 27, Geneva, N. Y.

**FREE!** Make rapid-fire sketches of pretty girls! It's easy, with "Stencil-Art" charts. No obligation, just send stamp. "Stencil-Art," Brookhaven, Ga.

**EARN** cash income, copying and duplicating simple cartoons for advertisers. 3-M Service, Argyle, Wis.

#### PLAYS—STORIES—MANUSCRIPTS

**SHORT** Stories revised, typewritten and marketed. Details free. Hursh Service, Box P-1013, Harrisburg, Penna.

#### ADVERTISING AGENCIES—FOR ADVERTISERS

**ADVERTISE** Profitably: \$15 reaches 6,000,000 Sunday newspaper readers with 24 word ad. Newspaper, magazine, rate guide, free. Chicago Union Agency, 20 W. Jackson, Chicago.

**FREE**—New Advertisers Rate Guide, 44 pages. Includes everything. Lowest rates. E. H. Brown Advertising Agency, 140 S. Dearborn, Chicago.

**ADVERTISING** Placed anywhere. Helpful, free service. Rate guide book free. Baker Advertising Agency, 189 W. Madison, Chicago. Successors to Ankrum Advertising Agency. Established 27 years.

**LEARN** Advertising quickly at home. Easy practical plan. No text books. Common school education sufficient. Interesting booklet and requirements free. Page-Davis School of Advertising, 3401 Michigan Ave., Dept. 3431, Chicago.

**MATCHES**—2,500 Books \$8.95. Quick cash sales. Rush printing instructions. Sanderson's Book Matches, Ottawa, Ill.

**24 WORDS,** 40 Newspapers \$2. Goodall Agency, 742 Market, San Francisco.

**ADVERTISE:** 5 Lines 100 national mail order publications \$4. Lists free. Advertising Bureau, 4515-C Cottage Grove, Chicago.

**INCH** Display advertisement 30 magazines year \$24. Wood's Popular Services, Atlantic City, (N. J.)

**ANY** Sales letter written for \$2. Komaroff, 522 Pine, Long Beach, Calif.

#### BUSINESS SERVICE

**WASHINGTON,** D. C., mail address. For business or personal purposes. Hawkins Mail Service, 817 Fourteenth.

**CHICAGO** Address for your business, personal mail. \$1 monthly. Letters, etc., forwarded daily. Established nineteen years. Dependable. General Service, 56 W. Washington.

#### TYPEWRITERS, DUPLICATORS, OFFICE DEVICES

**TYPEWRITERS,** Duplicators, multi-graphs. Write for free list office machine bargains. Save half. Pruitt, 518 Pruitt Bldg., Chicago.

**INCREASE** Business now. "Excellograph" Rotary Stencil Printer reprints thousands everything you typewrite, hand-write, draw or trace. Colors. \$19.75 to \$44. Terms. Illustrated literature free to business or professional men. Pittsburgh Typewriter Supply, Department K-2, Pittsburgh, Penna.

**NEW** \$3.75 Automatic adding machine. Fully guaranteed. Bassett, Box 302A, Altadena, Calif.

**TYPEWRITERS,** American Flyer. \$3.45. William Cleavelly, 126 Lexington Ave., New York.

**OFFICE** Machines, typewriters, adding machines, duplicators, etc., 29 different makes, care and operation of. Only book on subject. 384 pp. illus. \$2.50 postpaid. Popular Mechanics Press, Room (C37), 200 E. Ontario St., Chicago.

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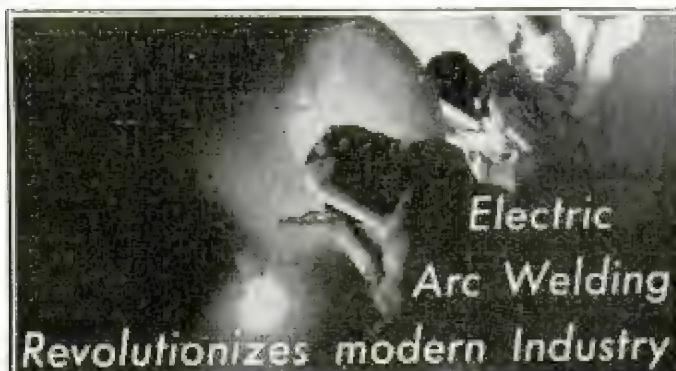
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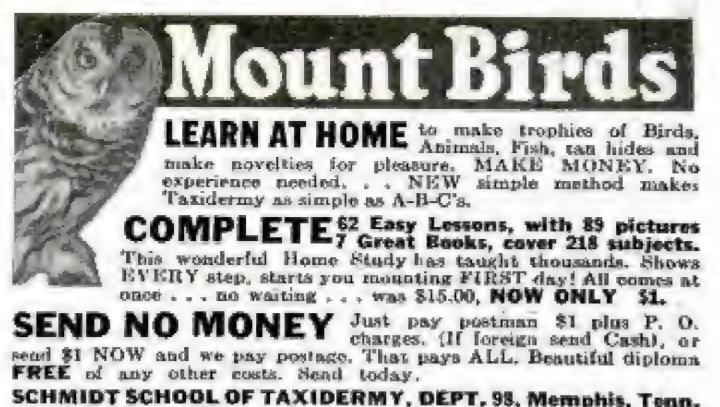
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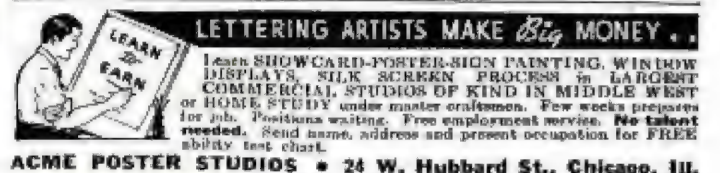
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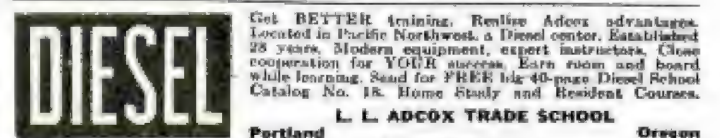
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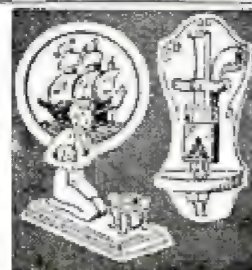
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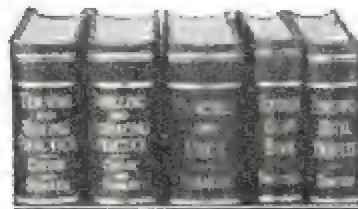
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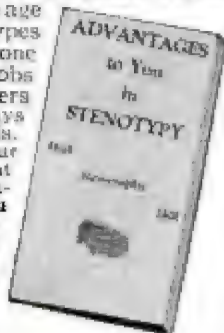


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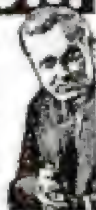
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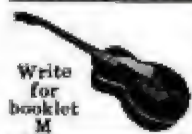


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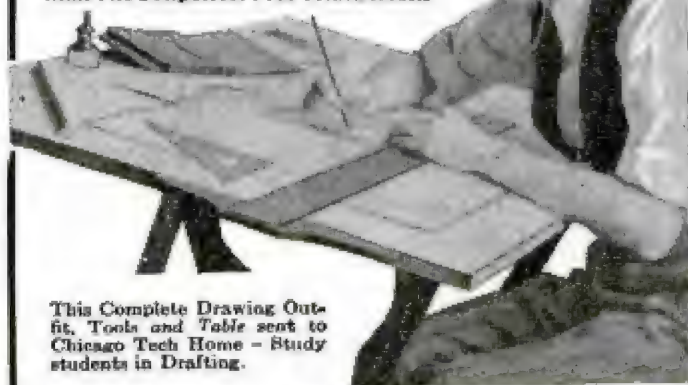
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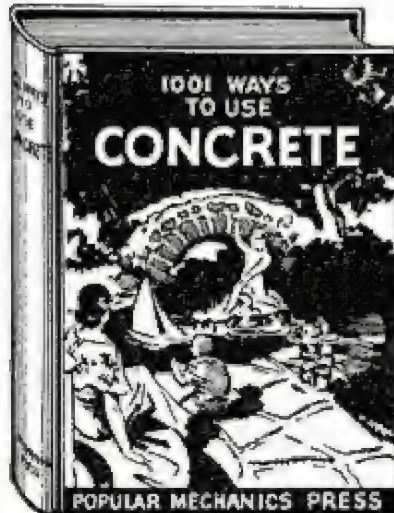
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PRINCE ALBERT THE NATIONAL JOY SMOKE

2 A POSTAGE STAMP, PLEASE -

AND A TIN OF PRINCE ALBERT. SAY, THIS IS A GOOD PICTURE, ISN'T IT? I CAN JUST SEE THE MAYOR SHOWING IT AROUND

3

4 Dear Mayor - POST CARD  
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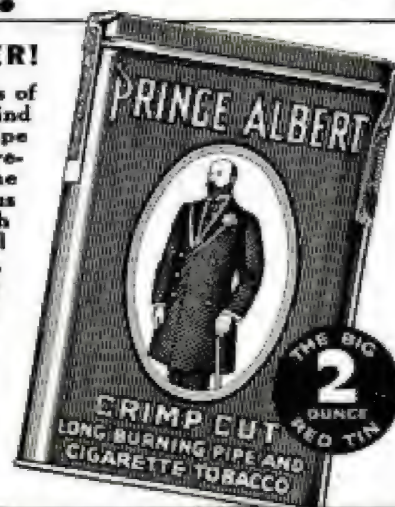
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WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 68

SEPTEMBER, 1937

No. 3



Here is the red-winged monoplane which brought three Russian fliers from Moscow to Vancouver, Wash., in slightly more than sixty-three hours. It is equipped with twelve-cylinder motor

By Julian Leggett

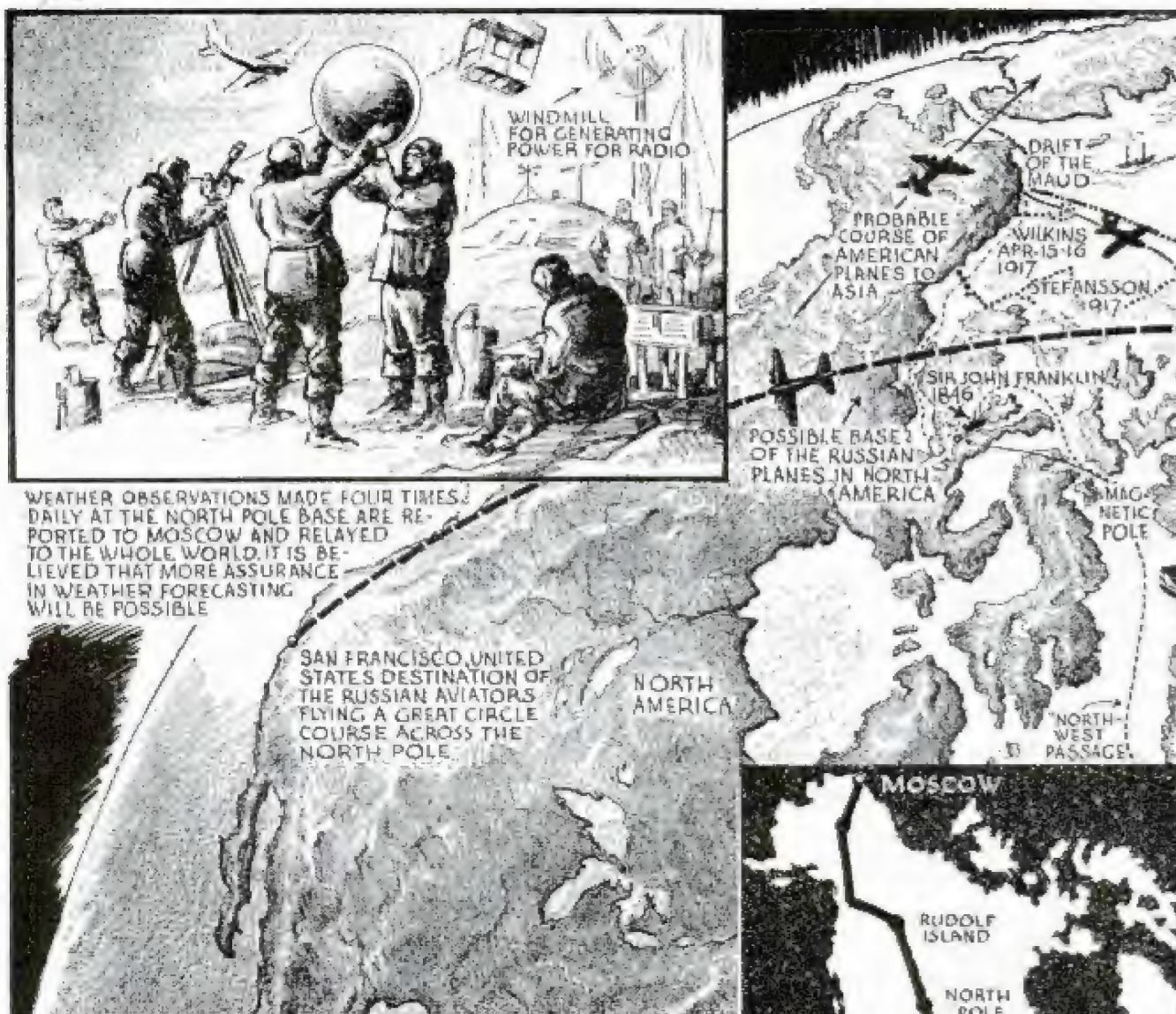
**P**ASSENGERS, mail and express will be transported between the United States and Russia, by way of the North Pole, within a few years, possibly by the end of 1942. Great multi-motored planes will take off at either San Francisco or New York, stop at a busy airport located within the Arctic Circle and then speed on to Moscow. It will be a 6,000-mile trip, made in less than sixty hours.

Already the trail has been blazed for the air line which will cross the "top of the world," as the frozen wastes around the North Pole are known. Just recently three Russians flew non-stop in a single-motored plane from the Soviet Union to the United

States. Earlier preliminary work was done by a group of Russians who flew to the North Pole and established a weather station a short distance away to collect data for use in planning flights.

The next step toward the spectacular goal of regular air service over the pole is expected to be taken at the American end of the route. Aerial surveys and weather stations will be necessary and test flights must be made, with pioneering pilots starting from either San Francisco or New York. Creation of a base on the Canadian side, matching one established by the Russians on Rudolf Island, 550 miles from the pole is regarded as advisable.





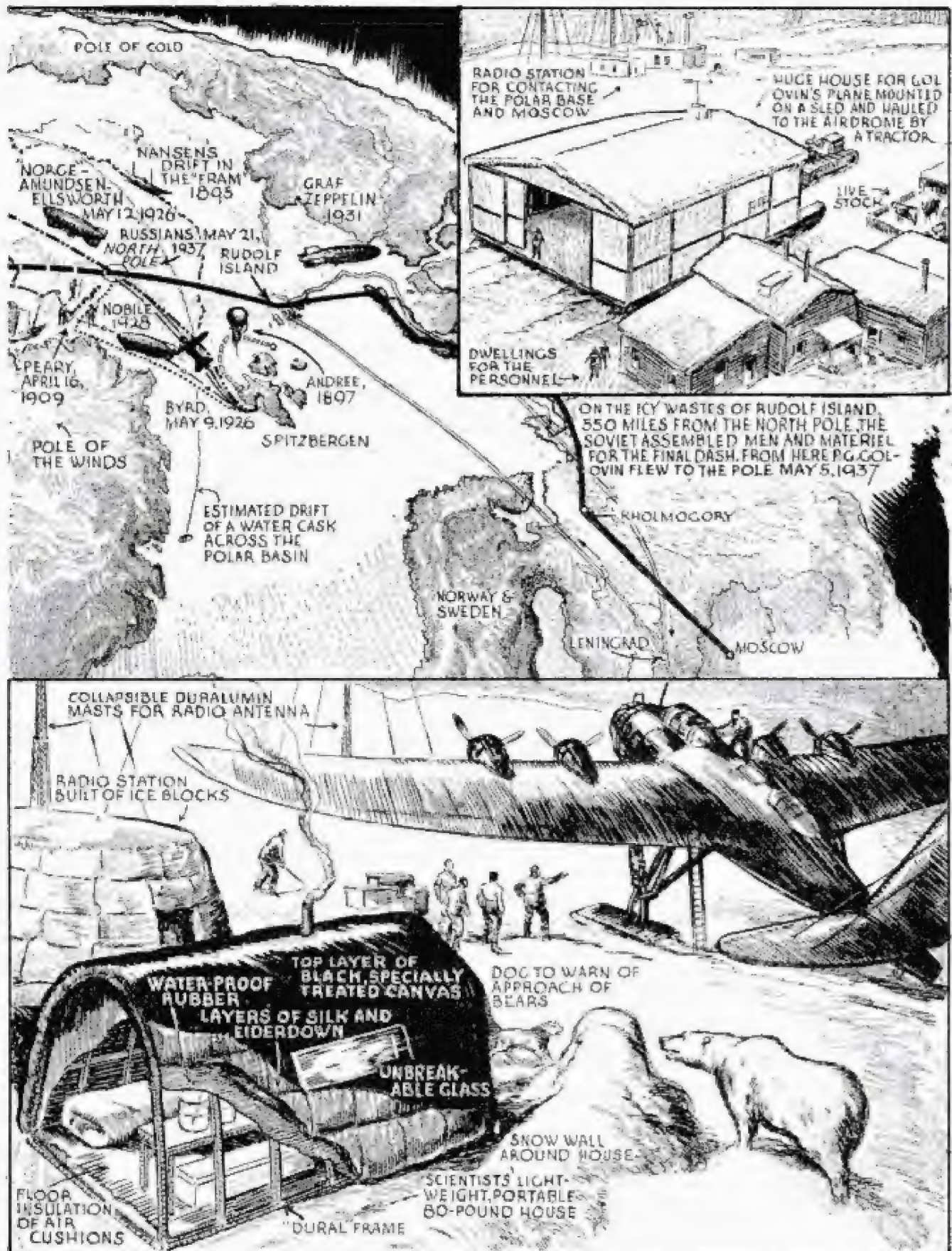
Originally the dream of Soviet explorers was an air line between Moscow and San Francisco, but already the possibility of making New York an alternative terminal is being discussed and the same Russians who flew from their own capital city to Vancouver, Wash., a few weeks ago, are planning a non-stop air journey over the North Pole to New York. At the same time, several Americans are considering similar flights, taking off at New York and landing at Moscow.

It was on Thursday, June 27, that the three Russians, Pilot Chekaloff, Co-Pilot Baibukoff and Navigator Beliakoff, quietly lifted their big red monoplane into the air at Moscow and roared away toward the North Pole. Not until a day later did it become known that their destination was San Francisco, some 6,000 miles away. They carried a radio which flashed a report at five o'clock Friday afternoon that "all's well." Ten minutes after midnight, Saturday, the plane passed over the North Pole and the weather station which had been set up near by. That afternoon the fliers reported from a point about 1,250 miles north of Edmonton, Alberta, Canada, and eight hours



On this and page opposite is a map of route Russia hopes to use in commercial air service. Top, left, on this page, and bottom, on page opposite, sketches of activities incidental to establishment and operation of weather station near North Pole. Top, right, on opposite page, station at Rudolf Island, which is within 550 miles of the pole





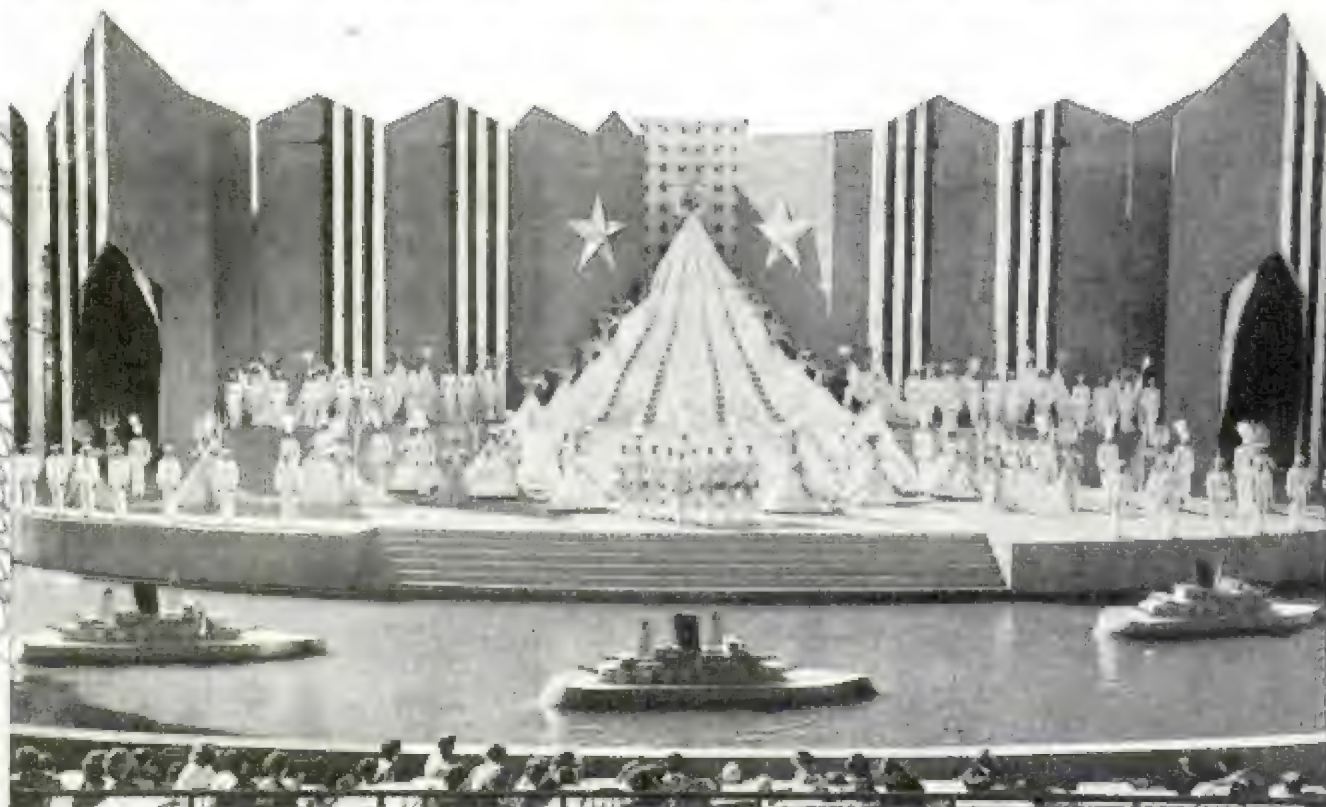
later they had turned out and were following the Pacific coast line toward Seattle. The plane continued to function smoothly and the goal was almost within sight when fog forced the fliers to land at Vancouver, less than 600 miles from San Francisco,

Had the ship been equipped with "blind flying" instruments like those used on American planes, it is considered highly probable that the venture would have been entirely successful, since ample gasoline

(Continued to page 148A)



# Stage on Lake Has Lighted Water Curtain

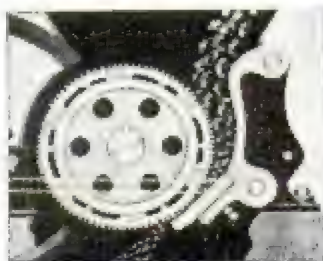


*Vast stage with performers in midst of a scene is separated from dining terrace by sixty-foot moat. Small boats shown here are operated by electricity brought up from bottom of pool through garden hose*

One thousand gallons of water per minute, spraying from 200 evenly spaced nozzles, forms the curtain for a giant stage featured at the 1937 Great Lakes Exposition at Cleveland, O. At night the water curtain is illuminated. Electric lights encased in waterproof containers are arranged so their rays travel with the stream at an angle. These lights also can be used as blinder lights, in case of water failure, to mask scene changes from the audience. Elliptical in shape, the 160-foot stage is moved back and forth on steel guide rails placed on the floor of Lake Erie. Power is supplied by a series of fifty-horsepower motors connected to the stage by gear racks. Towers more than sixty feet high at each end of the stage accommodate an orchestra on lower levels, divers on nineteen-foot balconies and high divers on levels thirty feet above the water. When the stage is moved out into the lake, away from the theater-restaurant of which it is a part, lift bridges thirty-two feet long are lowered from the towers to connect to the theater. A sixty-foot moat separates the performers from the audience. Special 5,000-watt electric lamps provide powerful light shafts required in illuminating the

stage. In addition, 2,000-watt lamps with baffles and concave reflectors supply intense light at 300 feet, and their beams can be controlled to produce a small spot at the maximum distance. Other lights whose beams can be shaped into squares, triangles and different figures contribute to the general stage effects. Twelve switchboards control the lighting system, but none of the operators can see the stage. They synchronize their work through a system of counts corresponding to marks on their dimmer plates and through cues given over a public-address system. Electric circuits to operate twenty-four boats in water fronting the stage are brought up from the bottom of the pool through garden hose.

## Crusher for Stoker Size Coal Has Removable Teeth



Designed especially for preparing stoker and smaller size coal, a crusher just put on the market breaks the coal

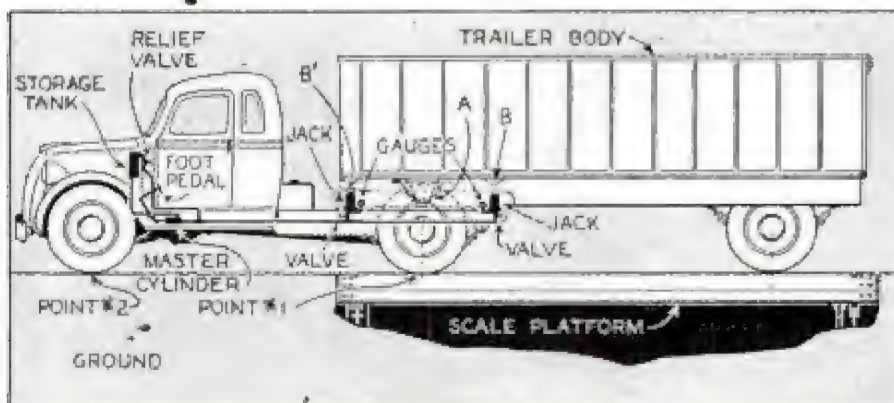
*The Jeffrey Mfg. Co.*



with a minimum of over-size and undersize fragments. It is a single-roll crusher, with renewable segments carrying thin, sharp pyramid and spear-point teeth and insertable feeder teeth for use when large coal is being broken up. The machine, because of the shape and pattern of spacing of its teeth, has a piercing rather than mashing action on coal.

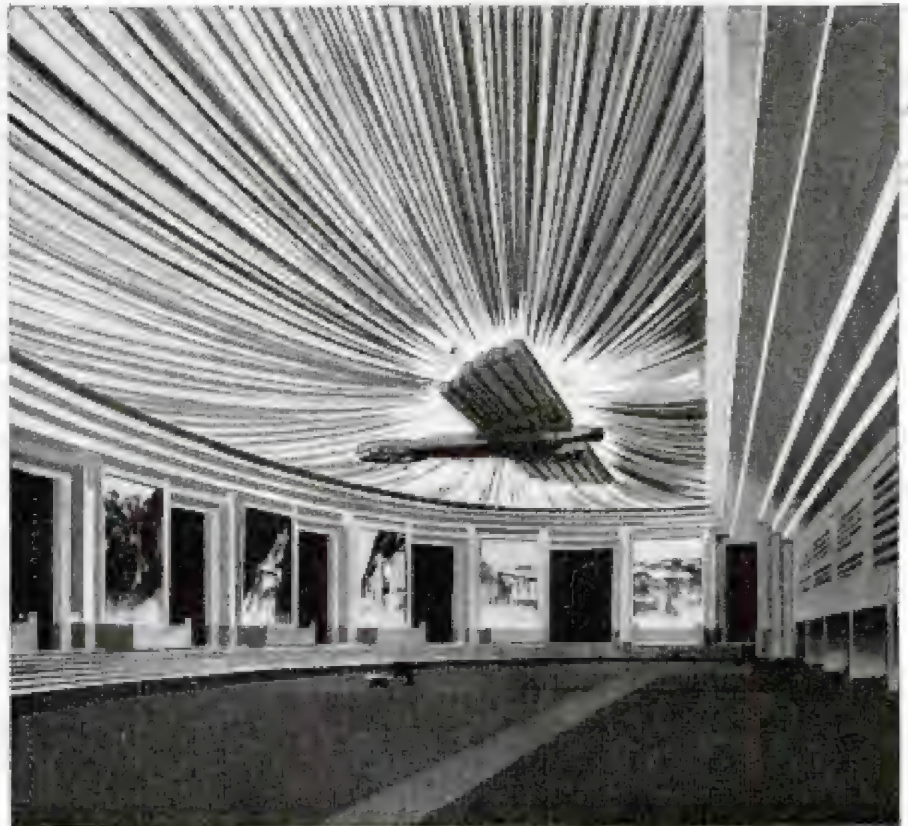
### Jacks Shift Load in Fraud Used by Truckmen

Cheating truckmen have worked out an ingenious arrangement of hydraulic jacks to swindle shippers and consignees by false weights. The jacks are installed behind and in front of the forward wheel of the load-carrying trailer in such a manner that the driver, by remote control from his cab, can shift the weight of the cargo. Pressure of a foot pedal would relieve the weight on the scales so that the scale operator would have to add more cargo to obtain proper gross and tare weights. On delivering the load, the truck driver would reverse the process and make the cargo seem heavier. Short-weight truckmen who were swindling shippers by this method in Indiana were apprehended and sent to prison.



Pressure on jack B shifts weight from point 2 to point 1 and makes scales under trailer read falsely high. Valves are controlled by pedal in cab

## Bright "Sunburst" Lights Hall Above Seventeen-Ton Eagle



Here is general view of Germany's Hall of Honor with its spectacular lighting. Figure of the eagle in center weighs seventeen tons

From above a giant metal eagle suspended from the ceiling flashes a brilliant "sunburst" to light the Hall of Honor opened recently in Germany. The eagle weighs seventeen tons and has a wing-spread of eighty-eight feet. Above the eagle is the ceiling, measuring 10,000 square feet. The sunburst effect is achieved by arranging powerful electrical lights in such a position that the rays come from a point just above the eagle and spread to all corners of the ceiling. Another feature of the hall is a set of motor-driven picture books installed in the walls. The hall is intended to tell a story of German achievements.

■ In the last four years the number of automobiles operating in Germany has grown from 1,633,000 to 2,475,000.

Cont. I van. Isrosvonor

S. A. E. Journal



# Bullet-Nose Fighter Flies 200 Miles an Hour

*A-17 attack plane*



*Acme*  
Attack plane showing its speed in flight over its army air-corps base. Notice the twin cabins, fore and aft. Below is a closeup view of its bullet-shaped nose. The ship is capable of 200 miles an hour

Four speedy attack planes that joined the army air forces at Langley Field, Va., recently are capable of better than 200 miles an hour. The trim, bulletlike craft has retractable landing gear and is a low-wing monoplane type, powered by a single motor. Forward and aft cabins are covered by transparent protective housing.

## Man's Hardest Work Produces Little Electric Power

Even when man is exerting his entire muscular strength, he is capable of producing only fractional electric power. In a recent test, an experimenter used a bicycle with rear wheel jacked up off the floor and hooked to an electric generator. Wires from the generator led to a switch and then to lamps whose total wattage was 320. While the switch was off, the experimenter pedaled easily, turning the gener-

ator at high speed. But when the switch was turned on, he was unable to bring the lamps to full brilliancy. After one minute's strenuous pedaling, which failed to generate 320 watts of electricity, he stopped. The electrical energy he had produced was less than one-half of one per cent of one kilowatt-hour. In the average home this amount of electricity can be purchased for about one-fortieth of one cent.

*es 79!*  
C. M. Ripley, Publisher, Sept. 1917  
P. H. Schuchman, Editor

*Northrup Aircraft Corp. Dayton, Ohio*



# Private Life of Microbe Is Shown by Projector



Even the microbe can have no private life these days, for "habitat groups" of living microbes, magnified millions of times, are being thrown on the screen of the microvivarium for human spectators. The crowded world of microbes in a drop of water, a pinch of mold, or a bit of slime is revealed as a moving drama on a six-foot screen. Eighteen feet from the screen a tiny glass chamber like a small slide, containing the culture, is slipped under a microscope. A projector lamp illuminates the tiny microbe world by a system of condensers and a cooling cell protects them from sizzling death. The Museum of Natural History in New York City plans a permanent microvivarium. On one screen you

may see graceful slipper animals, or paramecia, slowly moving about and reproducing by division. On another are tiny nose animals, or didinia, hunting prey; or sun animals seeking food with their radiating filaments. Sometimes a lecturer adds drama to the picture by injecting enemy microbes to devour others in the culture

© Dr. George Rommert

Top, crowd watching living drama of microbe groups projected on screens in microvivarium. Below, lecturer identifies microscopic "actors"



## Tourists to Ride Aerial Tram to Mountain Top



Up a wooded slope to the top of Cannon Mountain in New Hampshire an aerial tramway for passengers is to be built, the first of its kind in North America. The site of this scenic ride is a mile and a quarter from the famous "Old Man of the Mountain," and its base station will be at Franconia, N. H. The cable-hung observation cars will carry twenty-five passengers and an operator, and will take six minutes for the ride to the summit. The cost of the tramway, which is being built by the state, is estimated at \$250,000. It is scheduled for completion about July 1, 1938.

*Left, drawing of the aerial observation car. Below, its path from lake shore to summit of Cannon Mountain in New Hampshire.*



## Airplane Engine Weight Cut Forty Per Cent in Six Years

Aircraft engines have been "reducing" for several years, and today the average motor weighs forty per cent less per horsepower than six years ago. Engine weights have decreased from one and three-fourths pounds per horsepower to about one pound. Edwin O. Cooper, general service manager of the Pacific Airmotive Corporation, recently told a group of aviation

engineers that the principal unsolved problems of manufacturers today were icing of the carburetor, abrasives entering the engine in the air, sticking piston rings, inadequate filtration of new oil, oil sludge formation, accumulative drainage of oil in the motor after idle periods, and spark plugs. More frequent attention is given to spark plugs than to any other engine part.

es 796  
A. E. General  
July 1937

Union Terminal, Burbank



Chris' power -  
John E. Betz III  
A LUXURIOUS ocean-going craft  
is this sixty-one foot boat powered  
by twin engines and with plenty  
of space below decks.

Speedway.  
Designed by Sam and  
King. Built by Harry  
B. Davis, 205 City of  
Island Ave. New York



At Home AFLOAT

PART 2



Chris. Craft Corp.  
Albany, N.Y.

820



**THIRTY-TWO** foot double stateroom cruiser constructed of mahogany and white oak. It has a double-planked bottom.

## PART II

**S**O you own a yacht?" Thus your landlubber neighbors will greet you when you become the proud skipper of a boat—any kind of a boat. As far as most people are concerned, ownership of a boat—even a row-boat with a tiny kicker clamped astern—stamps you at once as a yachtsman.

Your friends have visions of you setting sail for Florida, land of allure to blizzard-swept northerners. Perhaps that is your intention—but if a water trip to Florida is out of the question, don't let that discourage your longing for a boat. Living afloat is not restricted to the winter playgrounds by any means.

Detroit is a notable example of a northern city where many families live aboard their boats all summer. Along Long Island Sound, the Hudson river and other waters surrounding our largest city are many splendid small boat harbors and fine yacht clubs. The same

is true of many other sections of this boating paradise—our own U.S.A. Visit one of Chicago's yacht basins some time. Nowhere in the world is there such a magnificent expanse of cruising waters or so many picturesque and protected harbors for small boats as in this country. And each year boat-basin and marina facilities are being more and more overtaxed.

Atlantic City is planning construction of a pleasure-boat basin with a capacity of more than 400 craft, hinging upon the proposed improvement of Absecon Inlet. New Jersey, through the board of commerce and navigation, which has charge of the state's waterway development, is planning a chain of municipal pleasure-boat basins along the coast to meet the demand of increasing recreational boating. Other states are also planning or actively building marina projects and other boat improvements.

The growing use of motorboats on in-

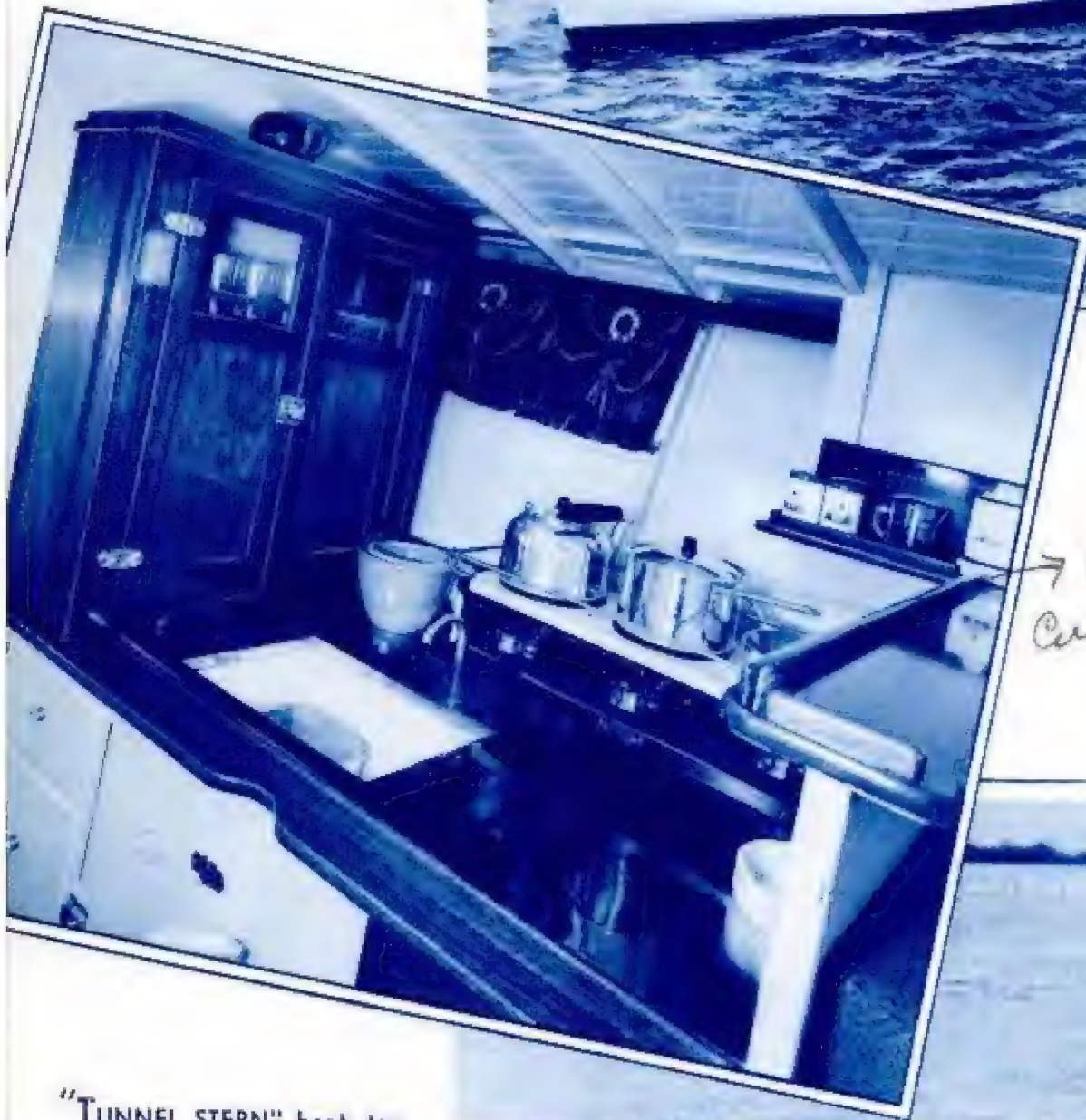


Higgins  
Industries, Inc.  
1755 St.  
Charles Ave.  
New Orleans  
La.



33

→ Chris-Craft  
Corp. Algiers  
Mich



"TUNNEL STERN" boat, top,  
with conventional bow built  
for both shallow and deep  
water use. Above, compact gal-  
ley of modern floating home.  
It is equipped with a three-  
burner alcohol stove. Right,  
thirty-five foot sport cruiser  
with demountable shelter top.  
This trim craft has living ac-  
commodations for six persons,  
a kitchen and dinette and is  
powered by two 130-horse-  
power engines.

Chris-Craft.







332

HERE'S an angler's dream come true—a floating home which permits fishing twenty-four hours out of every day.

*The Mathews Co Port Clinton, Ohio*

land waters is indicated through a forty-eight per cent gain in the numbered boats in the Mississippi valley, and an increase of seventy-seven per cent in the miscellaneous inland ports such as St. Albans, Vt., Ogdensburg, N. Y., Pittsburgh, Pa., and Omaha, Nebr. Increases in the various sections of the country range from forty-two per cent along the south Atlantic seaboard, to seventy-four per cent on the Great Lakes, a survey made for the war department engineers revealed.

The first pleasure craft launched on Norris Lake, a newly created reservoir of the Tennessee Valley Authority's major project, Norris Dam, was a twenty-five foot cruiser. The TVA is planning permanent facilities for pleasure craft on this lake which has a shore line of more than 700 miles.

"But a yacht costs a lot of money."

Again the landsman speaks, somewhat wistfully, and hoping against hope that maybe he is wrong. He is, generally speaking. There is, of course, no limit to the amount of money that can be spent for a yacht. But a yacht and a boat are two different things as far as the average man is concerned. A yacht means a craft running from forty feet up to several hundred; something like the "Nourmahal," for instance, the floating Astor palace, familiar by name to most Americans as the yacht on which President Roosevelt goes cruising. It is also contended by some that the term "yacht" more properly belongs to sailing craft and that boats propelled entirely by power are really motor or power boats. But that is drawing rather fine.



Chris-Craft Corp.  
Algonquin, Mich.



335



AFT cockpit, above, of thirty-five foot sport cruiser with demountable top. Below, twin gasoline engines drive this seventy-foot craft.

"Little Viking" Owner - George F. Baker.  
Mills, N.Y. Jack Murray





LOADING a forty-two foot "tunnel boat" built of steel, top, to deck of steamer. Below, boat with "spoonbill" bow negotiating shallow waters.

334 Higgins Industries, Inc. 1955 11 Charles Ave. New Orleans, La.

For as little as \$1,495, standard accessory group extra, you can buy a small, modern cruising motorboat that will take your family afloat for a day or an entire summer. It has four berths, electric lights, toilet compartment, sink, stove, refrigerator and all the requisites for living afloat. It is powered with a fifty-five horsepower motor and can slip over the water at speeds up to eighteen miles an hour.

It can be bought on the installment plan, too. The down payment is higher than the initial one on a small car but terms to fit the average bank account

and income can usually be arranged with factory or dealer.

From that point you can go on up as high as you please. Perhaps an average would be between \$3,500 and \$5,000 for a roomy, comfortable and seaworthy standardized cruiser. A very real little ship of thirty-two feet with inclosed deckhouse, and built-in dining nook that makes up into a sleep-inducing double berth at night, can be purchased for less than \$4,000.

It all depends upon the type of cruiser you want and the price you can afford to pay. There are fine single-cabin

Burke - Higgins







**BOAT** with "spoonbill" bow running over floating log. Such obstructions are no hazard to a craft like this. Top, thirty-two foot double stateroom cruiser which has a dinette convertible into a double bed and a lounge containing an upper and lower berth.

craft for less than \$2,000, and the new sedan-type cruisers run the whole gamut of prices. An innovation in small craft, seamless arc-welded steel hulls, is being offered this year by a Detroit designer and builder. Houseboats, too, with and without power, are available. One company is turning out a standardized houseboat without power for less than \$2,000.

If you are handy with tools there are plenty of good designs available from which you can build your own home afloat. Knockdown frames can be purchased from several companies, and with the hardest work already done, can be assembled without difficulty by even a tyro at boat building. As much as one-third, and sometimes more, can be saved in this way in addition to the satisfaction of building your own boat.

So try living afloat. You'll like it.

*Higgins Industries, Inc.  
1455 St. Charles Ave.  
New Orleans, La.*

*335  
Cruiser  
See last*



Es 200  
 Malheur Corp. Port  
 Clinton Ohio  
 336



*Clipper' under \$1,500.00*  
 TWENTY-FIVE foot cruiser with berths for four, toilet compartment and galley—and costing no more than a medium-priced car. Top, at the controls of a forty-two foot sport boat.

*Also Craft Corp. Glendale Mich*



# Cameras Map States from Three Miles Up



At left is the flying photographer making aerial maps of farm and forest areas. Each picture takes in about seven and one-half square miles. Above, computing acreages in the photographic map by means of planimeter and rotameter

graphs are enlarged and turned over to "ground crews" of the Agricultural Adjustment Administration, who use special planimeters and rotameters to compute the acreage in the picture. The maps are for use in computing crop acreages and

Flying cameramen are engaged in the vast project of mapping one-third the land area of the United States from the sky. Three to five miles high the pilots fly, while the photographer focuses on the farms and forests sprawling below and takes in about seven and one-half square miles in each picture. In one day an aerial crew can cover 300 to 500 square miles. The photo-

determining compliance with the government's agricultural conservation program, in planning soil conservation and public works projects, charting roads, parks, drainage ditches and dams, and forests.

¶ In 1918 Diesel engines cost about \$100 per horsepower, but today you can buy a Diesel for \$10 per horsepower.

Washington, D.C.  
The mall.

SA & Journal



## Mobile Machine-Gun Nest Carries Five Guns



*Nine-ton combat cars of the army's mechanized cavalry, carrying a four-man crew and five guns in single turret. Leader of tank platoon is also equipped with two-way radio telephone or key set*

Manned by a crew of four, the "traveling machine-gun nests" of the mechanized U. S. army cavalry carry five powerful guns—three thirty-caliber and one fifty-caliber machine guns and a Thompson sub-machine gun. These land-going dreadnaughts are designed for heavy

fighting, weighing nine tons each yet capable of traveling thirty-five miles an hour on their treads. Called combat cars, they are similar to the infantry's light tanks, but have single turrets instead of double. Each member of the crew carries a forty-five caliber automatic pistol.

## Four-Story Highway Map Is Painted on Side of Garage



*Huge map of Texas and part of surrounding states, showing principal highways, is painted four stories high on garage wall*

Guests leaving a hotel in Corpus Christi, Tex., for their automobiles find a road map four stories high facing them. Painted on the side of a garage is this vast map of Texas, showing its principal highways and part of the road systems of four surrounding states.

## Air Purified by Light Rays May Reduce Infection

By purifying the air with ultraviolet rays, scientists hope to place a check on infection by germs that enter the nose and throat—germs that cause the common cold, influenza, pneumonia, and the childhood diseases of measles

Capt. Larry J. Fisher 224

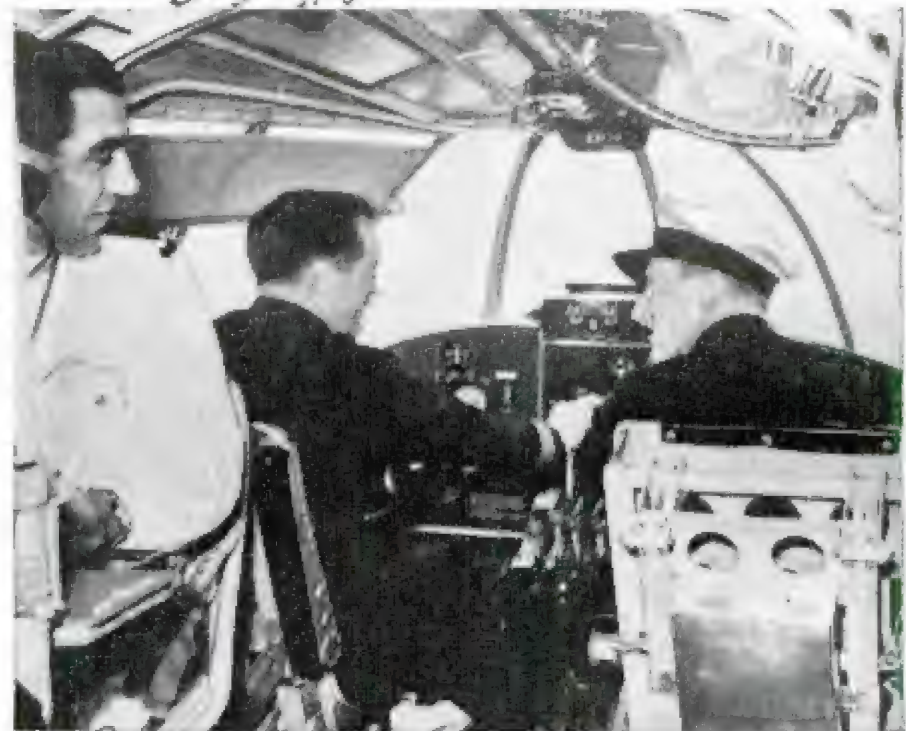


Chicago Tribune 6/26/35

William F. Hall  
Harvard School of Public Health  
POPULAR MECHANICS  
Harvard Univ. Cambridge Mass.

and diphtheria. Laboratory research indicates that by using ultraviolet rays, scientists soon may be able to purge the air of schoolrooms, public halls, hospital operating rooms and isolation wards. Tests are being made to determine whether this method of killing disease organisms in the air is practical.

## Flying Clippers Put Bermuda Five Hours Out of New York

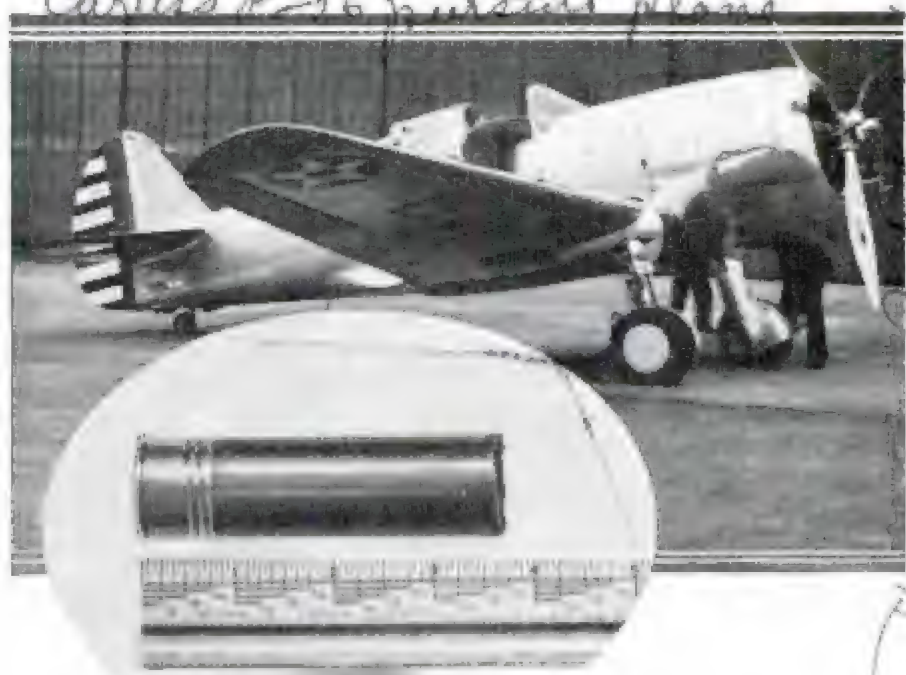


View of pilot's cockpit aboard a Bermuda-New York flying boat, showing the radio operator at his post directly behind the pilot

### Gun Shell Starts Army Plane's Motor

In the U. S. Army's latest pursuit plane, a shotgun shell is used to start the fourteen-cylinder motor. Injected into a breech located in the cockpit, the shell is fired by squeezing a trigger. Gas from the shell travels through tubing into a steel tank, setting a turbine in motion. The turbine has speed sufficient to start the plane's motor.

Bermuda is almost a suburb of New York, now that the "Bermuda Clipper" and the "Cavalier" are flying the route on four and one-half hour schedules. The Pan American Airways clipper and the twenty-ton flying boat "Cavalier" of Imperial Airways share the business, each ship making one round trip each week. This island trip is the first leg of eventual service by air from New York to Europe. Twenty-four passengers and a crew of five are accommodated on the ocean sky liners. The continental terminus is Port Washington, L. I. At Bermuda the ships moor in the harbor of Hamilton and passengers are taken ashore in launches.



Army plane in which is installed the shotgun shell starter. Inset, showing size of shell used to start aircraft's motor

One truck fleet in the western states operates on roads from 200 feet below sea level to 8,000 feet above, and at temperatures from twenty-six degrees below zero to 130 degrees above.

135 E 42nd New York City  
Imperial Airways

Curtis Aeroplane and

Sa. E. Journal



see April 1936  
508

Holliston Mass.  
Heron Park Rd.  
near Spencer, Mass.

# INVADING *a* LAST



Top, air escaping from diver below. Bottom, Diver Nohl being lowered over side

4642 Sherd  
By Max Gene Nohl

Famous Deep-Sea Diver

(As told to F. M. Bryan)

IN THE summer of 1935, I was salvaging the "John Dwight," a rum runner sunk off the coast of Massachusetts during prohibition days with a valuable cargo of contraband Scotch whisky and a quarter million dollars in cash. Fifteen men had been murdered in connection with the "Dwight's" sinking.

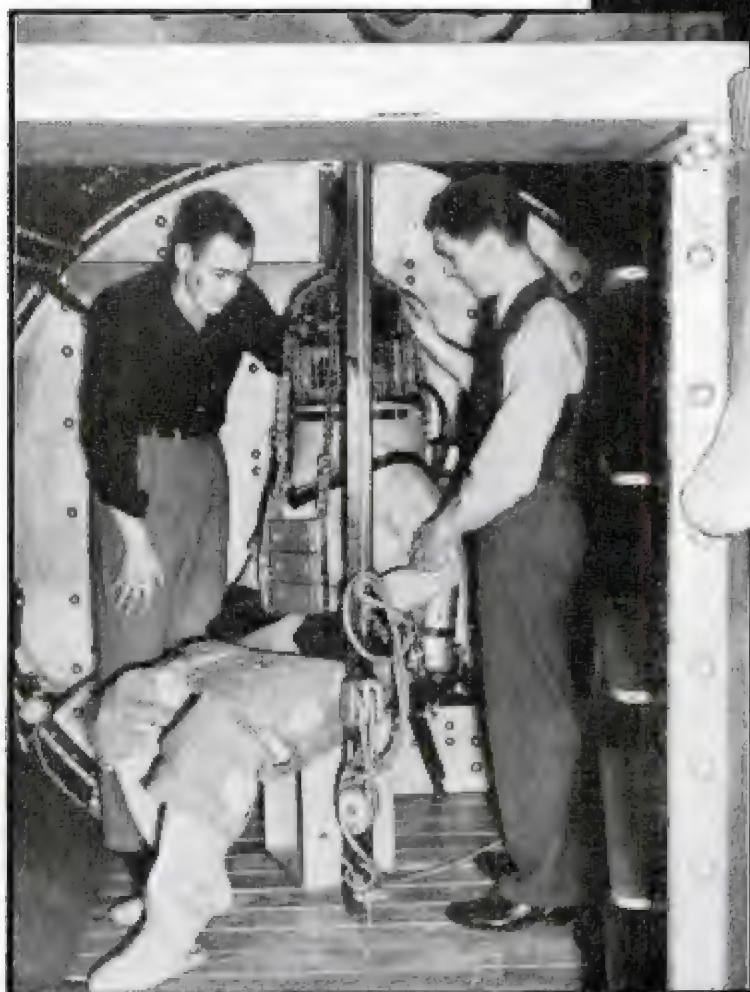
Capt. John D. Craig, famous diver and underwater motion-picture producer, was making photographic experiments in New England waters, and came to Cuttyhunk. We started discussing diving equipment. I told him of the very revolutionary type diving suit I had started developing as research work for a thesis at the Massachusetts Institute of Technology. To my amazement, Capt. Craig told me that several years before he had written a story about a completely self-contained suit quite similar to the one I was developing. I eagerly agreed to Capt. Craig's sugges-



# FRONTIER

tion I show him the practicality of my model right then.

The wreck was lying 110 feet below us. The day was ideal for diving tests. I was soon over the side of the "Silver Heels," my salvage ship. Capt. Craig had suggested certain time and location tests, and, after landing upon the wreck, I started a search for the ship's safe, a test we felt worth-while for many reasons. To say this was a nasty job would be putting it mildly. The ship had been loaded with contraband whisky, and I was endeavoring to walk as gingerly as possible for a diver through a field of bot-

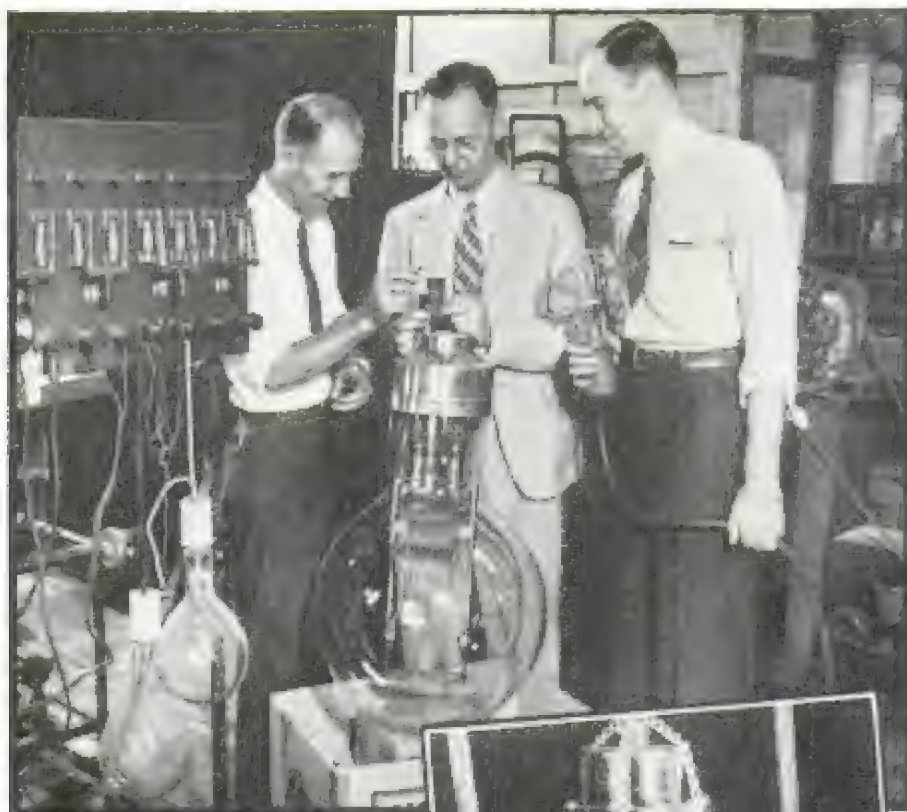


*Top, close-up of Craig-Nohl suit. Bottom, diver under observation in recompression chamber used by hospital for emergency cases of "bends"*

ties. A large object loomed in front of me. Could it be the long-lost safe? This safe contained records the Department of Justice and certain financial interests were equally anxious to see. What may or may not have been a skeleton was slumped beside it. The light was failing. Success was almost within my grasp when I received a "Must" signal to go to the top as rapidly as feasible. As much as I hated to do so, I started for the surface.

When my helmet was lifted I could see Capt. Craig was convinced that my equip-





ment would work. A storm was brewing. Diving was through for the day, and Capt. Craig and I settled down in the "Silver Heels" cabin to plan. Not until almost daylight the following morning was the little lamp turned out. Countless discarded sketches and calculations were strewn about the floor. From these scraps of paper had emerged the plans for a new super-diving suit we felt we could develop to perfection. Then began a long experimental period. We had many problems to solve. Numerous experiments resulted in astonishing developments. All the way from Wisconsin quarry holes, where particularly clear depths were available, to ocean waters off Bar Harbor and Sandy Hook and even to Caribbean and West Indian bottoms, we tried this and improved upon that.

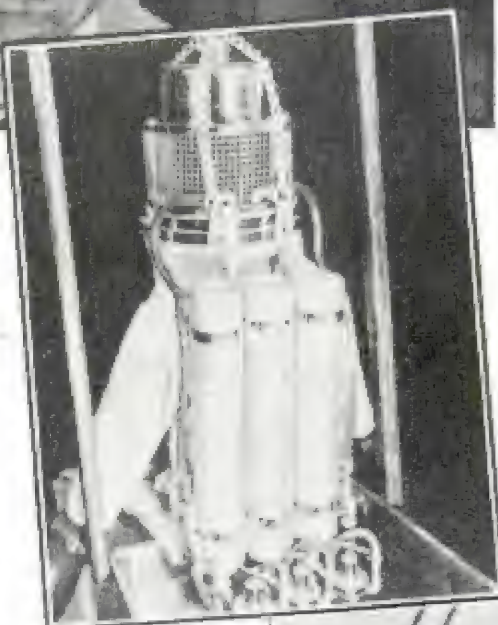
The first models developed were adaptations of standard diving suits re-built to provide room for an air purification and replenishment apparatus necessary in order to test some of the principles involved. Guinea pigs contributed their part, as did Capt. Craig and myself and other members

of the Craig crew. We were, in reality, human guinea pigs. Dr. E. M. End of the Marquette University School of Medicine, Milwaukee, Wis., was advising and rendering valuable assistance all the while. The Milwaukee County emergency hospital has a very fine recompression chamber. This was installed to render emergency assistance to divers or tunnel workers suffering from the "bends," something all divers fear. Dr. End suggested we subject ourselves to observation tests in this chamber and the tests were made.

Finally, on April 10, 1937, the U. S. Coast Guard Service placed the U.S.S. "Antietam" at our disposal. We went five

(Continued to page 144A)

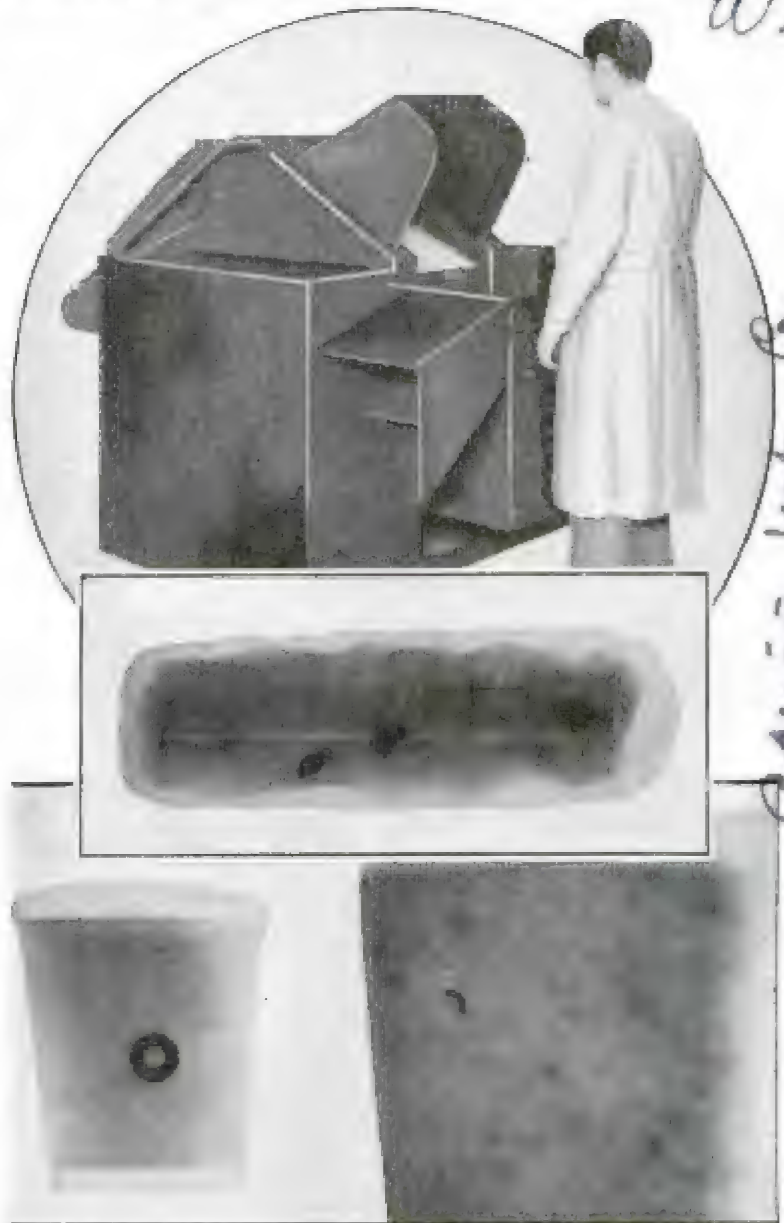
*Top, Capt. Craig (right) holding 1,000-watt undersea lamp. 5,000-watt lamp appears at left. Center, full-vision helmet shown with air-supply tanks. Bottom, adjusting helmet*





# X-Ray Shows Up Foreign Substances in Food

Thousands of dollars in lawsuits and hundreds of stomach aches are being saved by an X-ray machine that peers through food products and discovers tacks and broken glass and other bits of foreign matter before the food reaches you. A creamery company exhausted every possible lead in searching for the source of glass in butter it had sold. Then the X-ray, put to work, found a broken electric-light bulb in a barrel of salt. A woman sued a candy company because she bit into a candy bar containing a tack. A Chicago meat company lost a \$15,000 lawsuit because a man found a foreign substance in a can of meat. A Kansas City woman collected \$1,500 after finding steel shavings in a slice of bread. The X-ray machine sees through the product before it leaves the bakery or canning plant. Potato and pineapple and citrus-fruit growers look with the X-ray for decayed fruit and vegetables. Beverage packers spot short-filled bottles. Cartons or bottles pass on conveyors under a fluoroscopic screen while the operator watches, ready to throw a lever rejecting any food improperly packed or containing a foreign substance.



Fluoroscopic viewer and what it saw in food—metal fragments in candy bar and ice-cream cup and a washer in glass of jelly

## Model of Streamline Train Is Driven Like Automobile



Powered by a gasoline engine and steered like an automobile, a large-size model of the original Union Pacific streamline train travels about Omaha, Neb. On special occasions the model is driven to various points in the city for exhibition.

Patents relating to electricity are being issued at an estimated rate of about 3,000 a year.

Cont. Ray Blain

Stone & Co. Webster



## War Tank Making Attack Is Grim Sight to "Enemy"



Face to face with the latest army tank, the "enemy" is staring right at death. Note anti-aircraft gun aimed skyward to fight off planes

When the U. S. army's latest fighting tank bears down on the "enemy" soldier, it is a grim sight, literally a case of staring death in the face. The big armored tank carries machine guns, two of which are aimed to the front and another upward to ward off attacking aircraft. At close quarters a member of the tank's crew rises from the interior and turns his rifle on the foe. Radio headphones worn by this warrior indicate the means of communication between the tank and headquarters.

### Diamonds Made from Starch of Tropical Arabic Plant

Diamonds can be made from starch—real ones as big as the chip diamonds in a

wedding ring. Dr. Willard J. Hershey of McPherson College in Kansas has produced twenty-five such diamonds, one of them a one-thirtieth carat gem, from gum arabic, starch of the tropical arabic plant. With the aid of manganese steel he developed also some pink diamonds, unlike any found naturally. It is the carbon in starch that forms diamonds. Dr. Hershey dissolved the carbon in molten iron, then chilled the iron with brine. Breaking it open, he found as many as six starch diamonds.

### Airport Fire Guard Dons Asbestos Suit on Way to Blaze

Asbestos uniforms are packed on the new fire engine at Croydon airport near London, and the firemen can change to the protective suits while speeding to a blaze. Wearing these suits and helmets they can plunge into the midst of the fire to rescue trapped victims.



Airport fireman lifting lid of helmet worn by asbestos-clad fire fighter. Note hook for rescue work

© Planet News, Ltd.

*Chicago Tribune 6/24/37*



# Robot Sparring Partner Registers Fist Power

For a sparring partner that can take all the punches you give it, try the robot boxer. It never strikes back, but it weaves and sways in quite unrhythmical and unpredictable ways when you land a punch, and helps harden the fist, develops boxing skill and builds arm muscles. The robot is a plastic model of the upper part of the body, equipped with a device to offer resistance corresponding to the various weight classes of the pugilist. It can be equipped also with a measuring instrument which shows the strength of your punch.



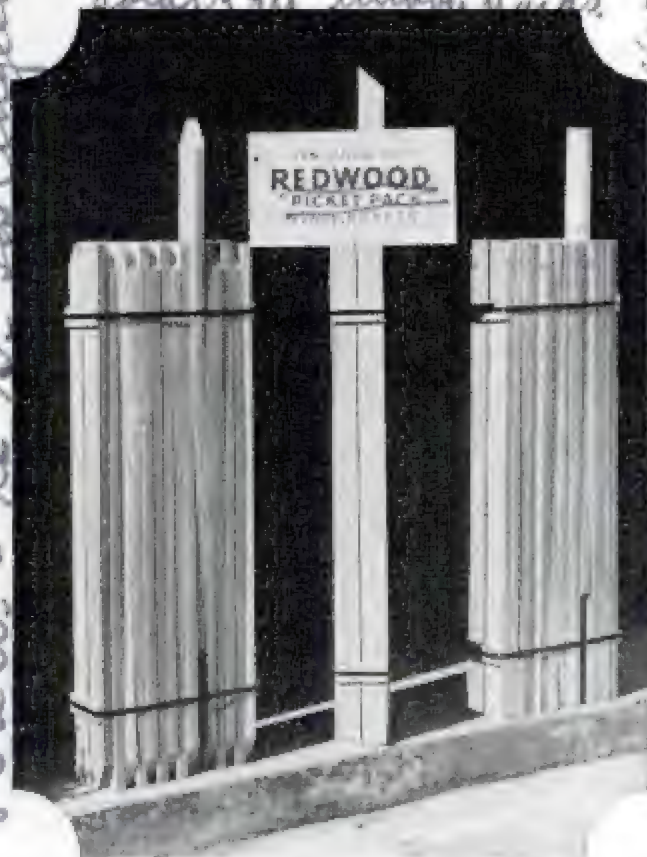
Left, boxer in training with robot sparring partner which weaves and rebounds in unexpected ways. At right is the robot with meter registering power of boxer's punch



## Fence Pickets by the Package Are Offered Ready Made

Packaged pickets, ready for you to build your own fence, are available today in more than 100 styles and sizes. One pack

of pickets is sufficient to build from six to eighteen feet of fence, according to widths and spacing. You can order the packaged fence in square-top style, beveled, pointed, curved, modern, Gothic, colonial, and many other types. The redwood pickets require no preservative treatment.



Three styles of the redwood picket fence that comes in package form. Many other designs are available

## Heat Dissipator Built in Tire Lengthens Its Life

Consisting of a section of special compound, cool-running stock built into the truck tire tread, a heat dissipator keeps the tire cool and lengthens its life. The construction feature is said to generate less heat in the shoulder area, which is the part of the tire in which temperatures as high as 365 degrees have been recorded, and it dissipates heat generated by the constant flexing of the cord body. Temperatures of 290 to 300 degrees are common in tires used on trucks in heavy-load, high-speed operation.

Whenever you find that you wish to know more about any article in this magazine, write our Bureau of Information, inclosing return postage.

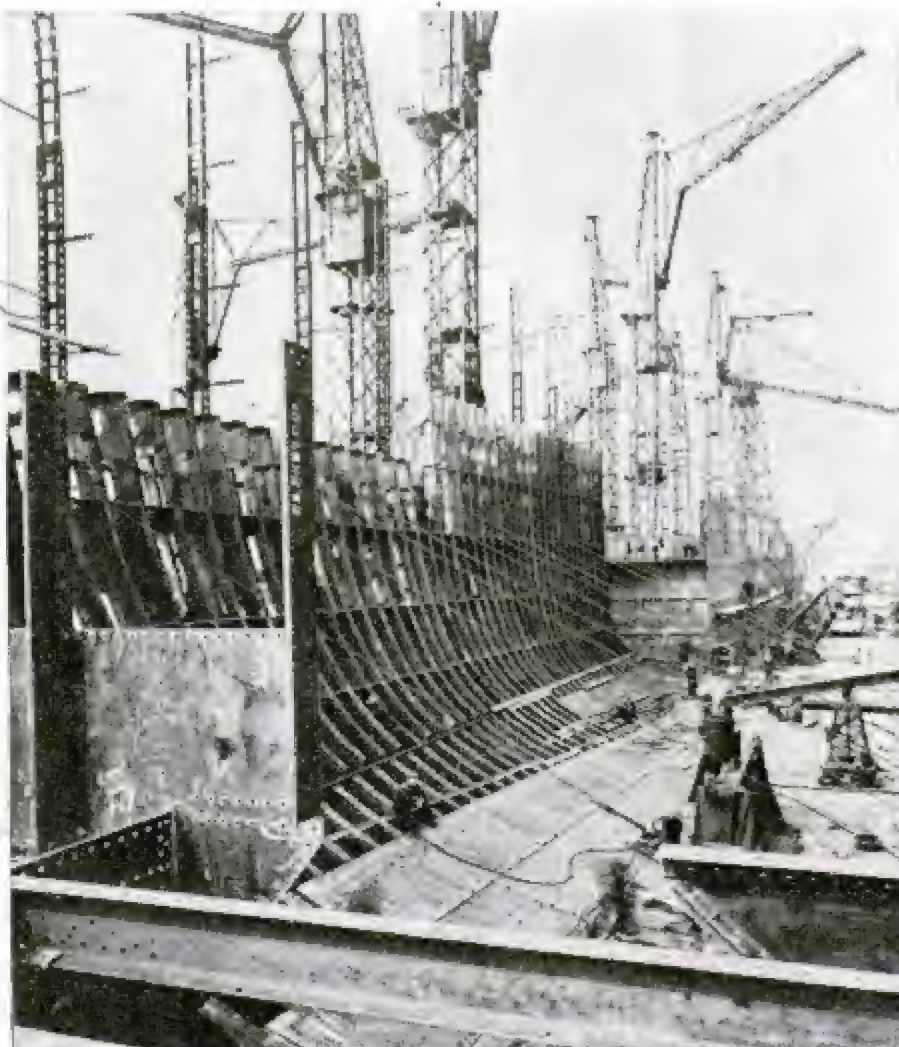
California Redwood Association



6/23/37

# Big Liner's Steel Framework Rises as Workmen Speed Up

Cunard White Star Line 25 Broadway New York City



Here is the latest view of construction of giant liner. Note the giant steel ribs and plates curving to form the big ship's side

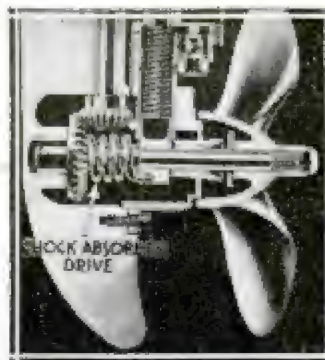
Framework of the giant ocean liner, the Cunard White Star Line's No. 552, is rapidly taking form as workmen speed up. Intended as a sister ship to the great "Queen Mary," No. 552 is being constructed at Clydebank, Scotland.

## Long-Range Weather Forecast to Show Only the Trend

Predicting the weather for long periods in advance is unlikely, according to Hurd C. Willett of the Daniel Guggenheim Aeronautical Laboratory of the Massachusetts Institute of Technology. Accurate forecasts of local conditions can be obtained only when a full knowledge of widely distributed meteorological conditions are available both from ground stations and

from aloft, the scientist asserts. This full knowledge is necessary, he points out, because the specific air masses are continually forming and disintegrating. Willett says that it seems improbable that the detailed development of air masses yet unborn can ever be forecast. Long-range predictions are based on the known fact that frequently pronounced weather abnormalities may persist over considerable areas for weeks, months and even years. Studying weather maps, carefully prepared daily, may furnish a current picture of general circulation of weather over large areas and may furnish a clue to future weather because of the influence of the general circulation pattern on contemporary weather conditions. But it is believed hardly possible that long-range forecasts can ever present more than a general trend, subject to constantly changing local conditions.

## Shock Absorber in Boat Drive Guards Outboard Motor



Protection of the outboard motor and its drive system is afforded by a shock-absorbing spring built into the drive. The spring absorbs most of the shock of hitting small obstacles. It does

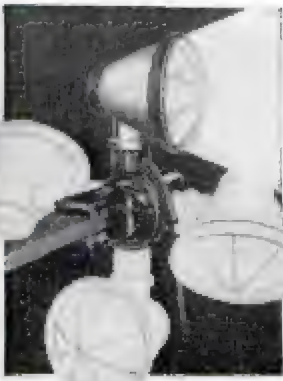
not eliminate the sheer pin adopted several years ago. The pin is used in attachment of propeller to the shaft and is constructed to sheer off easily if the propeller

Johnson Motor Co



strikes an obstacle, thus saving drive shaft and motor mechanism from damage resulting from sudden stopping. The new spring is arranged so it winds up slightly if the propeller blade hits a log or other obstacle, permitting the blade to slip off the obstruction. If the obstacle is large enough to stop the propeller more than momentarily the pin will sheer off as usual, providing a double protection. The shock-absorbing spring saves time and expense of replacing the pin in most cases.

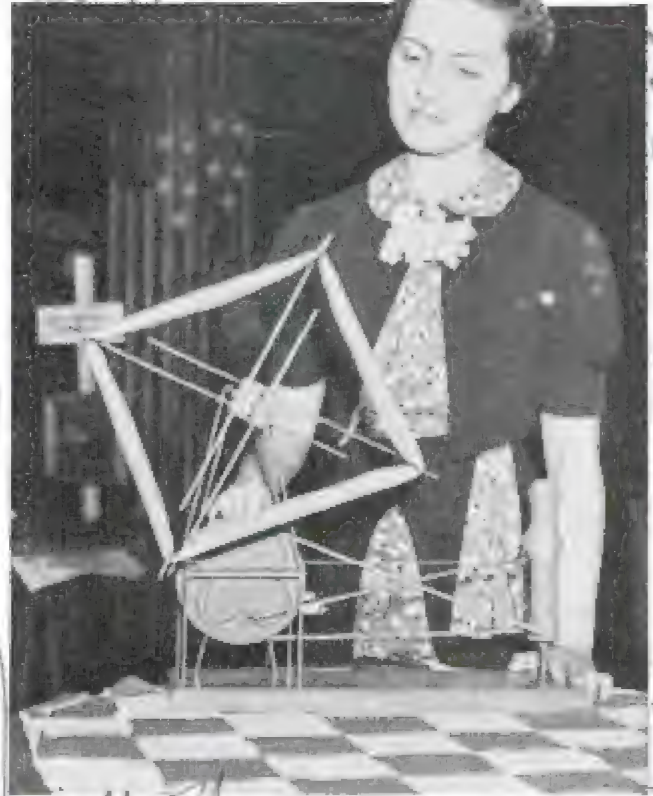
### Adjustable Lamp for Workshop Can Be Rotated Full Circle



Universally adjustable, a work lamp for the home, shop or automobile clamps on to any convenient projection and can be rotated 360 degrees around the clamp to light any part of the room or any point of

work. The clamp has rubber grips to avoid marring any surface. Although intended primarily for connecting with an ordinary electric-lighting circuit, the lamp can be used with low current from batteries by means of a screwed-in reducing socket and a special cord for attaching to the battery.

### Rotary Winder Holds Yarn While User Knits



Here is a handy winder for yarn exhibited recently at an inventors' convention

Making it unnecessary for someone else to hold the yarn while the housewife knits, a handy rotary yarn winder has been invented. The device does a good job, holding the yarn in about the same position as a person using both hands.

### Air Mileage between Any Cities Shown on Fliers' Map



Scale across top of U. S. map indicates mileage by air when cord is stretched between two points

Mileage by air between any two points in the United States can be measured quickly on a map used by army pilots. There is a mileage scale at the top, and stretching a cord to the desired destination pulls a tiny block of wood along the scale to mark the mileage for the route. It is easy to read and quite accurate.

Popular Mechanics Magazine does not publish the name of the maker of, or dealer in, any device described in its pages, but this information will be furnished by our Bureau of Information upon receipt of return postage.

Prof. Kros Electric Works

Cml. Private Edwards

21. ranker Germany  
Kathryn Miller  
1549 Western Ave. Albany

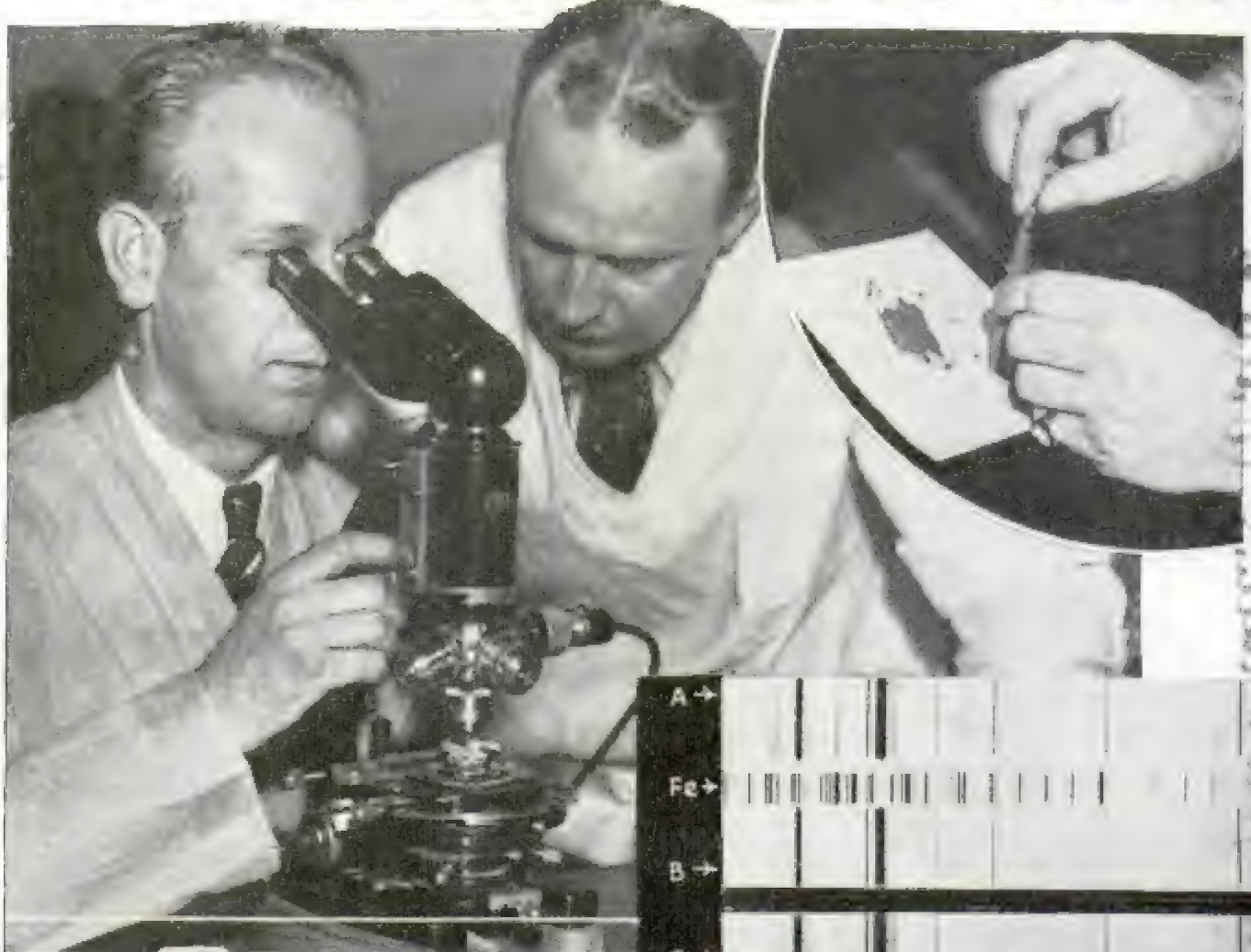
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at Ellwood Field



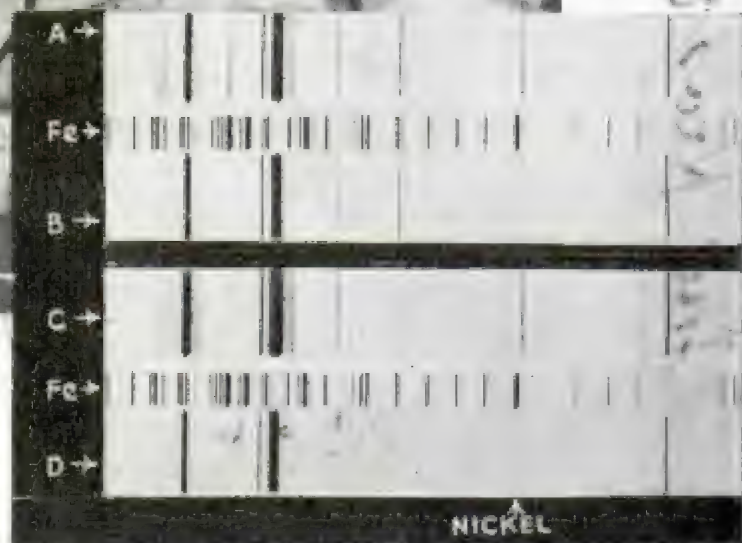
54 1/2 : Islandale Blvd.  
Los Angeles Calif.

# TRACKING CROOKS



**A**NALYSIS of tiny bits of material picked up at the scene of crimes is speeded up so much by a rapid-fire spectrograph developed at the California Institute of Technology that a day's work may be done in a few minutes. This new equipment already has been employed in a large number of cases by W. W. Harper, consulting physicist of the Los Angeles and Pasadena, Calif., police. Secret of the process is the fact that each chemical element, when burned at a high temperature, gives off its own characteristic color.

This principle is put to work by placing a sample of any unknown material in a cup-shaped crater at the tip of an electric arc's carbon electrode. Immediately it tints the white-hot arc, whose light, passing through a narrow slit, falls upon a curved grating and is shattered into a rainbow of colors. Photographed, the rainbow becomes a series of parallel lines, each line corresponding to a known chemical



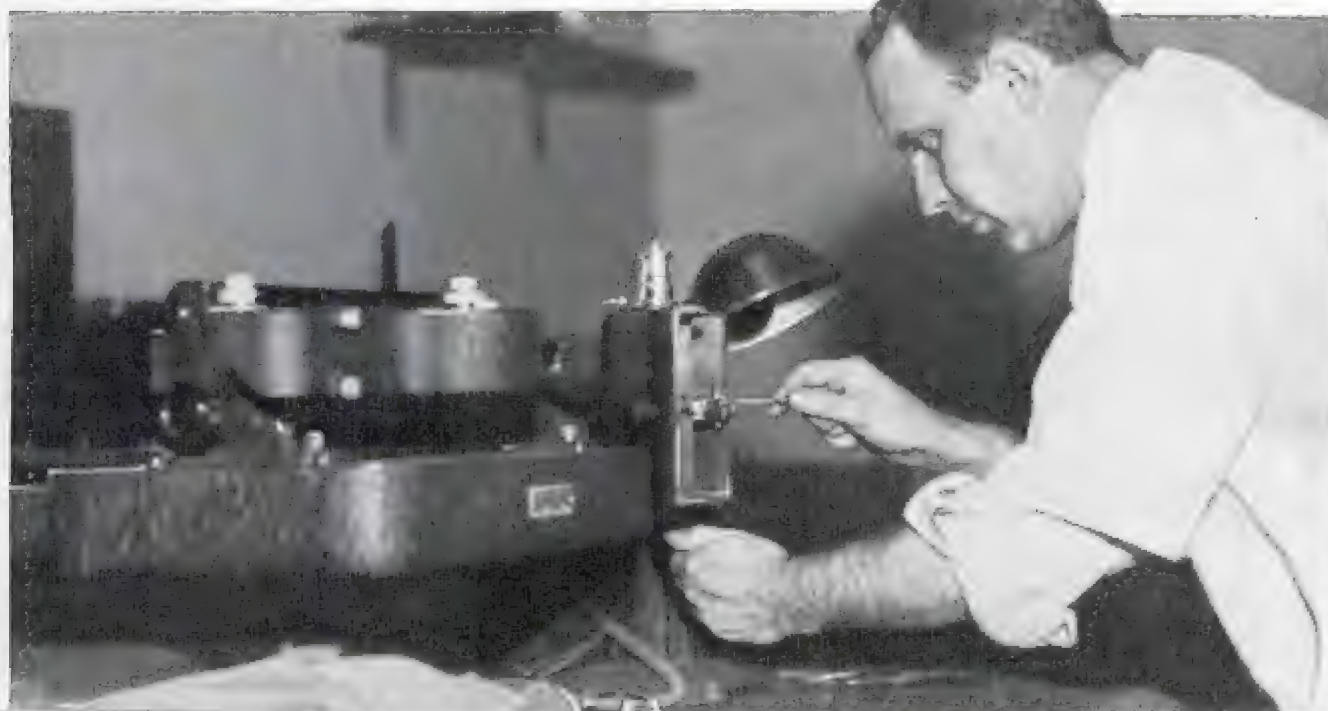
Left, studying wrecked safe combination in burglary case. Right, putting pinch of material into hollow tip of arc for test. Bottom and extending across next page, spectrograms from bogus coins and metal samples found in counterfeiter's house. Note how vertical lines correspond

element. Put the film beside a master strip containing lines of all the known elements, and instantly you can see which ones are present.

Day after day the spectro camera is being used to free an innocent man or to point to the guilty. When a boy riding a yellow bicycle was struck by a hit-and-run driver, radio police soon picked up a man driving a car on whose front fender was a smear of yellow paint. He protested his innocence. Police scraped off a flake



# *with the* SPECTRO EYE



of the paint, another from the bicycle itself, and sent them to Harper's laboratory for test. Within half an hour they had the report—the samples were chemically entirely different—and an innocent man was cleared of suspicion.

Police answering an ambulance call found three wrecked cars piled up in a tangled heap. Near by, a young pedestrian lay dead. Witnesses said one car had struck the boy, then caromed into the other two—but could not agree which was the death car. In a cuff of the dead boy's trousers was



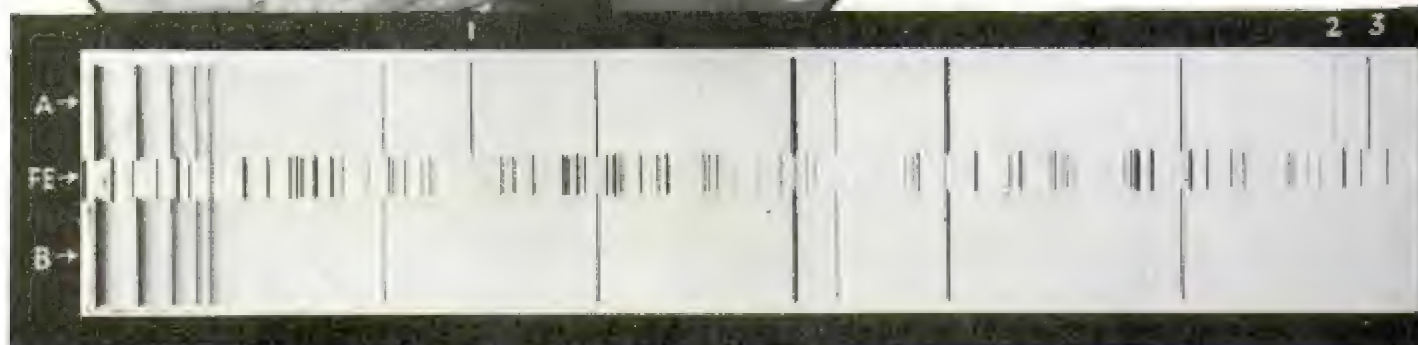
*Top, loading spectrograph with sample for test. Bottom, projecting spectrum film on screen to compare telltale lines*





dropped by the supposed thug, then at the wound on the woman's forehead. It was but a mere scratch. In the man's garage they found a similar piece of gas pipe, marked, like the other, with green paint used to seal the joints. Spectro tests soon showed this paint to be a hodgepodge of leftovers all poured together; and a dozen characteristic impurities proved the samples identical, definitely exposing the holdup story as a fake.

At a downtown railroad



*Top, taking sample of bogus coin in counterfeiting case. Bottom, spectrogram of two bullets in murder case. Note thallium lines, 1, 2 and 3, in Bullet A which are not present in Bullet B, showing the bullets to be different*

found a tiny sliver of glass. Lenses of all three cars' headlights were broken, but from the wreckage police gathered up six pieces of headlight glass—one from each car; one from the spot where the boy had been struck, another from where his body had been dragged, and another from a point between.

One after another these fragments went into the spectrograph. When seven dripping films hung from a rack in the police darkroom, Chemist Ray Pinker and Physicist Harper examined them closely. The trail of broken glass leading from the point of collision to the boy's body clearly belonged to one car only. No other car could have touched him. This plain evidence brought a confession from the driver of the death car.

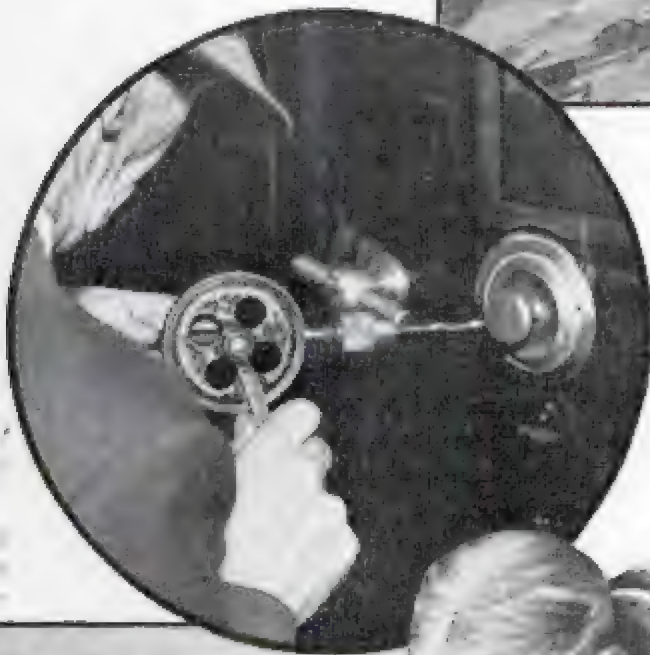
Another time, a man and his wife faked a holdup on the doorstep of their landlord, hoping to avoid paying their rent. Detectives looked at the piece of gas pipe

crossing late one night, an intoxicated motorist racing to beat the train ignored a flagman's swinging lantern, knocked him to the pavement, and drove on, leaving him lying with a fractured skull. When police arrived, some one in the crowd said the driver had parked his car a block or so down the street and returned to mingle with the bystanders.

A detective quietly slipped away and walked along the long line of parked cars that had collected. At length he found one whose left front fender bore a deep dent, crossed by deep grooves in which tiny fragments of red glass gleamed like rubies in the lamplight. Police trapped the driver when he returned and brought the car to the police laboratory. A camera was used to photograph the material in place for evidence. Then with a powerful light and a wide-field microscope, Physicist Harper went over the fender with a needle and flicked off the tiny slivers of glass onto a



piece of paper, gathering about one milligram of them—hardly a pin-head in quantity. This he emptied into the crater of the spectrographic arc and sent the current flaming across. Next followed a test of glass from the flagman's broken lantern. Side by side, the two films revealed identical stripes, showing twenty-two characteristic materials common to both.



Many of them were substances not found in ordinary glass. For the inebriated driver to pretend innocence was obviously futile.

Perhaps the most uncanny trick of the spectro sleuth is to determine what kind of bullet killed the victim, though the bullet itself is missing. This bit of magic depends upon the fact that if you rub a piece of lead upon your hand, it will leave a black mark. In the same way, a bullet in-

(Continued to page 138A)



*Top, examining kit of tools in burglary case. Center, taking a sample from steel safe for spectro assay to compare with shavings from suspect's drill. Bottom, using microscope to collect tiny flecks of material from dented fender to prove guilt of hit-run driver*



## Clinic for Birds Is Equipped Like a Modern Hospital



Attendant administers anesthetic with eye dropper before performing operation on injured bird at clinic

Pet birds have their own special clinic in Houston, Tex., where a bird physician and surgeon attends the ailments of feathered patients daily. It has up-to-date hospital equipment, and oxygen tanks are even provided to care for pneumonia victims. The operating table looks like a tiny ironing board, and an eye dropper serves to administer anesthetics. The bird pictured is about to undergo an amputation.

## License Stickers to Foil Thief Pasted in Car Windows

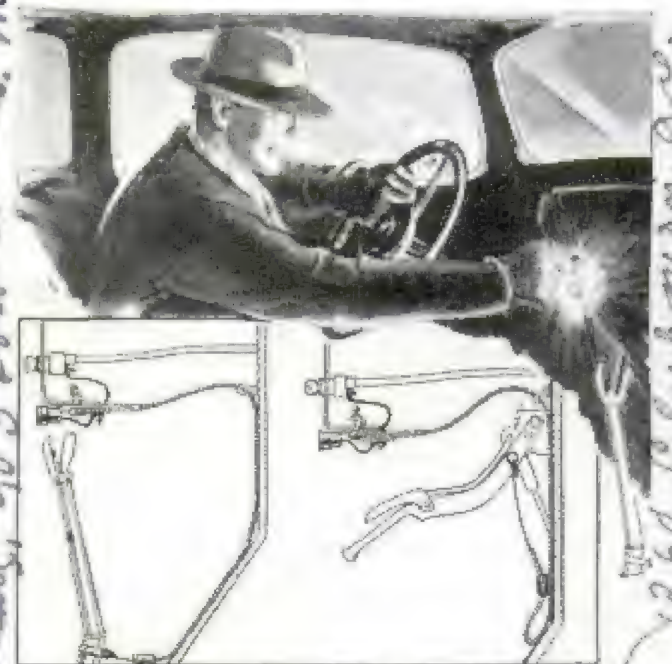


Duplicate licenses, applied to windshield and rear window of the automobile in the form of stickers, are urged as a means of foiling car thieves. Numerals of the licenses are printed on the side next to

the glass, making it extremely difficult to alter or deface them without detection. Made under patented processes the stickers are hard to forge or imitate and secret identifying marks can be placed on the reverse side to safeguard against illegal reproduction. Known as decalcomania licenses, the stickers have been endorsed by authorities in many American cities as a valuable aid in detection of auto thieves. State legislatures are being asked to enact laws requiring the licenses on all cars. The stickers, which would carry the same number as the plate attached to front and rear of the car, are inexpensive.

## Hand Brake Light Flashes Warning to Driver

Designed to warn the driver against driving with the emergency brake set, a small electric light for dash installation is on the market. Taking its current from the car battery, the device does not operate until the ignition is switched on, thus preventing waste of electricity. When the ignition key is turned to "On" position, the light flashes, warning the driver to release the brake before he attempts to operate the car. The light and connections are easily installed. Tests show that the device may be the means of eliminating strain on motor and preventing damage to brakes and linings caused by driving while the emergency brake lever is set.



When driver switches on ignition, red light warns him to release hand brake

no further info.

Miss Mary Shear

Bureau, 403 East Arcadia, Minneapolis

1260 Clyburn av.

Harvey Goldstein

Reliance



# Japan Matches War Planes of Other Powers



Some of Japan's latest fighting aircraft on the line, ready for practice flights. Note the odd-looking noses of the planes in which machine guns are located. Armor extends to the landing gear

That Japan is not lagging in the world race for supremacy of the air is revealed by photographs of the eastern empire's latest war planes. Her new powerful

bombing planes are armored all over and have machine-gun nests built into their noses. In performance these craft compare favorably with those of other nations.

## Ocean Beach in Miniature Has Artificial Tide and Wind

What quirks of nature have caused the ocean to cut away some of California's

best known bathing beaches? To answer the question, army engineers have reproduced a beach in miniature and provided it with mechanically induced tides, winds, currents, and wave action in accurate scale. In some cases breakwaters were found helpful in protecting the sand beach, while in others the model demonstrated that the breakwater spoiled the beach by interfering with natural shifting of sand.



Model of ocean beach with tiny breakwater built to show whether it protects sand slope from waves

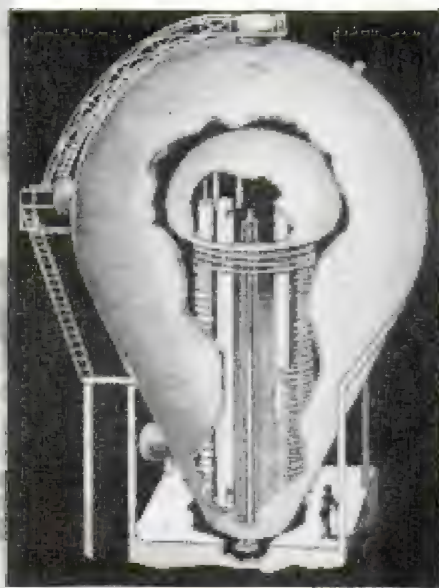
## Police Cars' Three-Way Radio Speeds Up Crime Work

Speeding up their campaign against crime, police in an eastern city are using three-way radio. Under the usual police radio system, a squad car calling for help from another car must transmit the message through the central station. The new system not only permits squads to exchange messages with headquarters, but also allows the cars to contact other cars directly. The broadcast is on the five-meter band, with a range of at least ten miles. The system is said to have helped save several lives in recent emergencies.

*Developed by Charles J. ...*  
*in charge of ...*  
*Eastchester Police Dept.*



# Big Vacuum Tube Is Target Range for Atoms



Left, artist's drawing of the pear-shaped tank to be built at East Pittsburgh, housing forty-foot vacuum tube for smashing atoms. Above, a cutaway view of the 5,000,000-volt generator

In a mammoth balloon-shaped tank containing a forty-foot vacuum tube, scientists soon will bombard atoms in their effort to solve the mysteries of the structure

of matter. The tank itself is thirty feet wide and forty-seven feet high. Its electrostatic generator will develop 5,000,000 volts to speed particles of matter through the gigantic tube at velocities as high as 100,000,000 miles an hour. As these particles travel at inconceivable speed they will be counted, measured and identified by special instruments. The atom smasher will be located at the Westinghouse laboratories in East Pittsburgh.

## Three-Color Photo Phoned from Chicago to New York

Transmission of a three-color photograph by telephone from Chicago to New York was accomplished recently in a demonstration of the Finch Telechrome system. The picture was wrapped around a drum revolving at a fixed speed. A small spot of light projected on the drum moved steadily lengthwise along it, thus tracing a spiral curve around the drum and crossing the picture in a number of parallel lines, eventually covering the entire sur-

face of the photograph. As the light spot traced a particular line across the picture very little light was reflected from a black surface and a large amount was reflected from a white surface, with the amount of reflected light varying between these extremes as the picture density varied. The varying reflected light struck a photoelectric cell and the light impulses were changed into electrical impulses which acted as a throttle on a tone generator. The

William L. H. Finch

Editorial: L. W. Chubb.  
Pittsburgh, Pa.  
6/16/27



tone generator produced a tone suitable for transmission over the regular long-distance telephone circuit employed in the demonstration. On the receiving end the tones issued from a handset phone lying on a table. As the tones came over the wire a pencil of light scanned a rotating eight-by-ten inch film on the receiving machine, imprinting upon it varying intensities picked up and sent by the transmitter. Three color separation prints were received as negative films, from which positive films were made, one being toned to each of the three primary colors of red, yellow and blue. Engraving plates which may be used for printing color pictures can be made at this point, as was done during the demonstration, or the three colored positive films may be superimposed and backed with white paper to produce a natural color photograph. At the transmitting end the three color separation prints are made on a single sheet of paper so their long axes are parallel and their short axes coincide. They are mounted on the transmitter drum in such a manner that the light spot traces over the three prints simultaneously, that is, the light spot crosses the red print, then the yellow, then the blue, then the red again, and so on. Success of the Finch system is said to depend upon three things: first, the color separation negatives at the sending end must be true and distinct; second, the picture signals must be true and strong to overcome noises present in a long-distance wire and, third, the color key sent with the picture must be exact and exactly reproduced to result in a color picture suitable for plate making.

### Baby Organ in Folding Case Has Tones of an Accordion



Pressure of the knee against one of the metal brackets gives this lightweight suitcase organ the tones of an accordion

It sounds like an accordion, folds into a small space like an accordion, and is carried like an accordion, but it is really a portable organ. Built for use in trailers, in camp, class rooms or chapels, or in small apartments, it has a keyboard like an organ, of three and one-half or four octaves, and folds easily into the form of a light suitcase. The accordion tone is produced by pressing the knee against a metal bracket.

### Water Pressure Washes Glass with Flying Sponge Pellets



Bombarding the inside of a drinking glass with little pellets of sponge rubber impregnated with emery, a washing machine for glasses operates without power. It utilizes water pressure. Mere faucet pressure of clear, fresh water circulates the pellets which dislodge dirt and polish the glass, at the same time cleaning themselves. The machine was designed for cleaning glasses at soda fountains.

### Four-Cylinder Race Cars Used for Ease of Assembly

Drivers in American automobile races prefer four-cylinder cars because the engines are less costly and easy to take down and assemble, according to Harry Miller, veteran builder of contest autos. A great majority of engines in the 1937 race at the Indianapolis Speedway were fours.

Esuswald Mfg. Co.  
Chicago

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Del. Webster 3837

Chicago Tribune  
11/16/37



magical

# PICTURES from



*Beautiful moonlight effect at left is produced by pointing against setting sun and stopping down lens opening. City lights at night make effective picture*

bring that highly prized remark from your friends — "There's a beautiful picture! How did you take it?"

An artistic sunset picture possibility is not waiting for you every night in the week, so don't

**D**ID you ever stop to realize how considerate nature is of the amateur photographer? Month after month she changes the appearance of landscapes, trees, shrubs and even the skies, giving us something new to "shoot at" almost every day.

Now she is slowly shifting her scenery and preparing for her autumn display of new flowers, colorful foliage and, last but not least, beautiful clouded skies to serve us with fascinating backgrounds for landscapes and sunset snapshots.

Don't overlook the opportunity to capture a few of these beautiful sunsets for your photograph album. They add interest to your picture collection and usually

rush out the door after reading this and expect to find one made to order. Perhaps you will, but it is not likely. A good sunset picture is one of those things you must watch and wait for.

You will find that a foreground of water or a background of hills will add much to the interest and artistic appearance of your sunset. By all means wait until there are clouds, for it is the clouds that "make the picture."

No set rule can be made on the exposure time for sunset pictures but generally you will get a properly exposed negative if you set the diaphragm at f.16 and the shutter speed at  $\frac{1}{100}$  of a second. This setting of



# SUNDOWN *to* DAWN



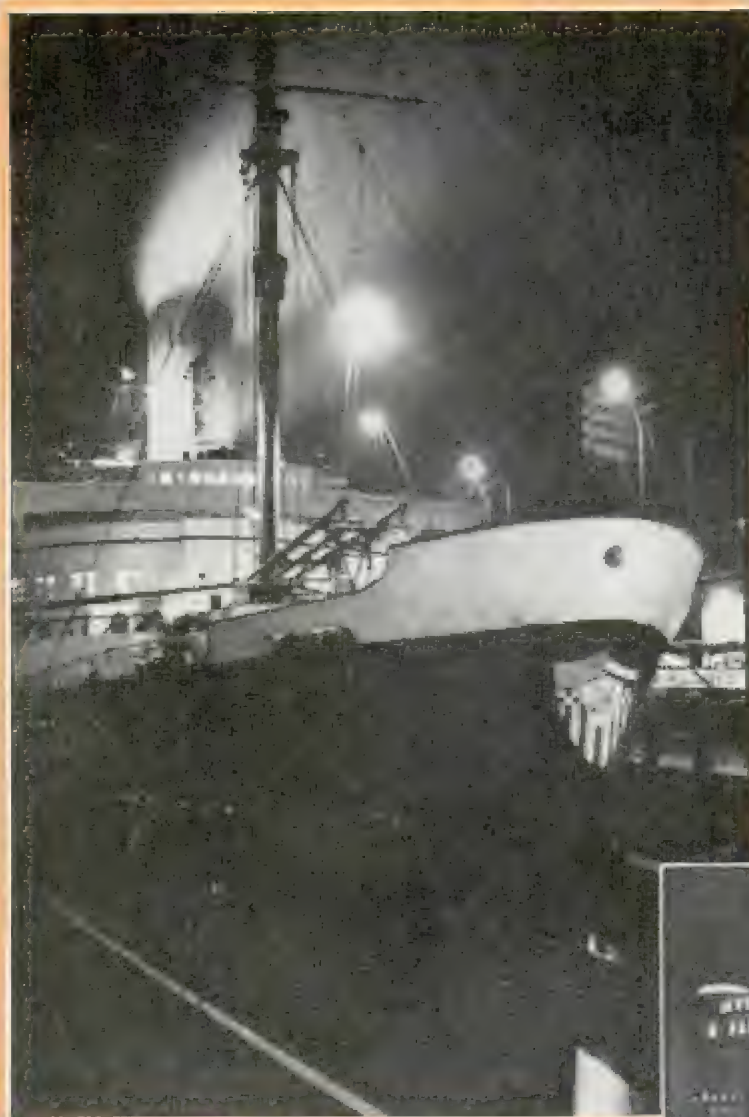
the diaphragm and shutter depends much on the brightness of your setting sun.

Believe it or not, attractive "moonlight" scenes can be made by sunlight. This is best done during the sunset hour and when there are masses of clouds floating in the western sky which create lighting conditions favorable for simulating moonlight scenes. The sun can be wholly or partially obscured and if the light is red, yellow or orange a snapshot exposure with a medium stop



*Dark trees against massive cloud form a picture of startling beauty at top. Below, an ordinary farm scene is made worth-while by low angle of camera and cloud background*





opening can be given. To secure a night effect from a negative exposed in this manner, it must be printed long enough so that all but the highlights will be dark. If you don't do your own printing, explain what effect you want to your finisher.

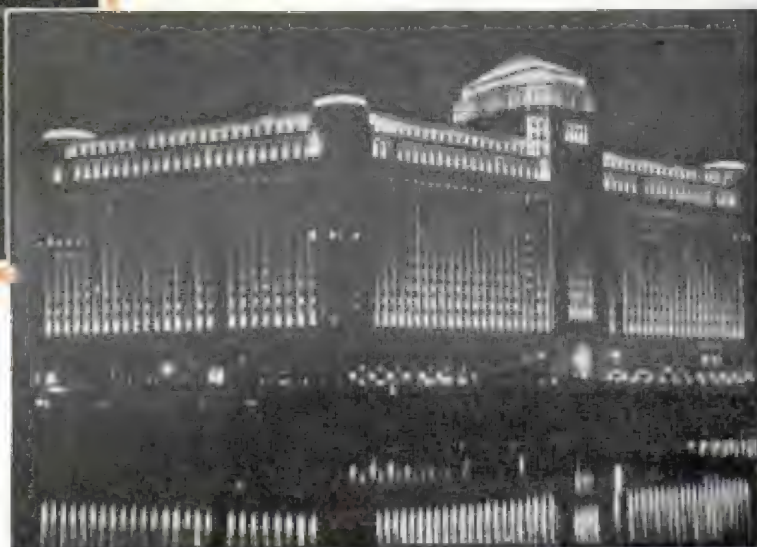
You will get a lot of pleasure taking these pictures and the result will be well worth your time and effort.

Remember this, too. You don't have to stop taking pictures with the setting of the sun. Taking pictures outdoors at night is really fascinating and a lot of fun.

With even the most inexpensive cameras, lighted street scenes can be photographed with little more experience than it takes to make a snapshot in the day time. The lighted theater entrances and business districts of the average town or city are good subjects for night pictures. If the pavements are wet, so much the better, for you may get some interesting reflections.

You'll probably have to make fairly long-time exposures, but even so, traces of occasional passers-by or vehicles will not appear on the negative provided they do not stop in the field of vision. If an automobile or trolley car comes toward the camera, either close the shutter or hold something dark over the lens until the headlights have passed.

The length of exposure will necessarily depend on the quantity and quality of the light on the scene and the size of the stop opening of the camera. With stop f.8, corresponding to stop 4, the U. S. scale of shutter openings, or f.11, the equivalent of U. S. stop 8, an exposure of from two to ten minutes for a well-lighted subject will give satisfactory results. With a box-type camera the first

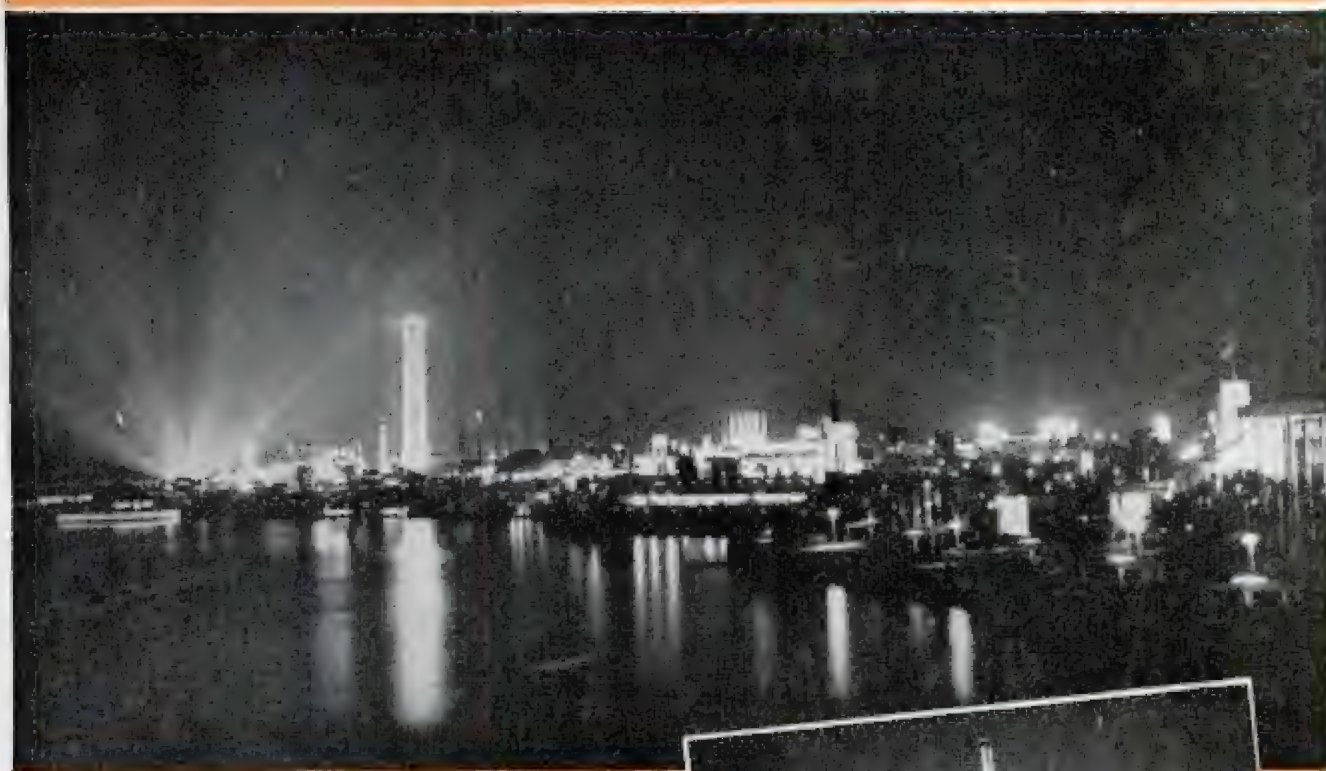


*Top, ocean liner outlined against night sky. Below, lights and reflections of Chicago Merchandise Mart*

stop should be used. If the illumination is weak, the exposure may have to be increased to twenty-five minutes or more. Be careful not to move the camera.

Buildings all or partly outlined with electric lights make fantastically interesting pictures. Details of the building should not show in the finished print or the effect will be spoiled; therefore, care must be taken to avoid over exposure. Use stop opening f.16 and allow about five to fifteen seconds depending on the brilliance of the lights. This setting should give detail around the lights only and make them





stand out. The tops of buildings are often brilliantly illuminated with floodlights. These lighting effects can be captured with five and ten minute exposures, using stop f.16 on folding cameras or the first stop with box types. Make a note of the diaphragm setting and the length of the exposure on your first picture. If over or under exposed, profit by your first experience and try again. Don't be discouraged by failure on the first attempt. Practice is better than reading a book on the subject.



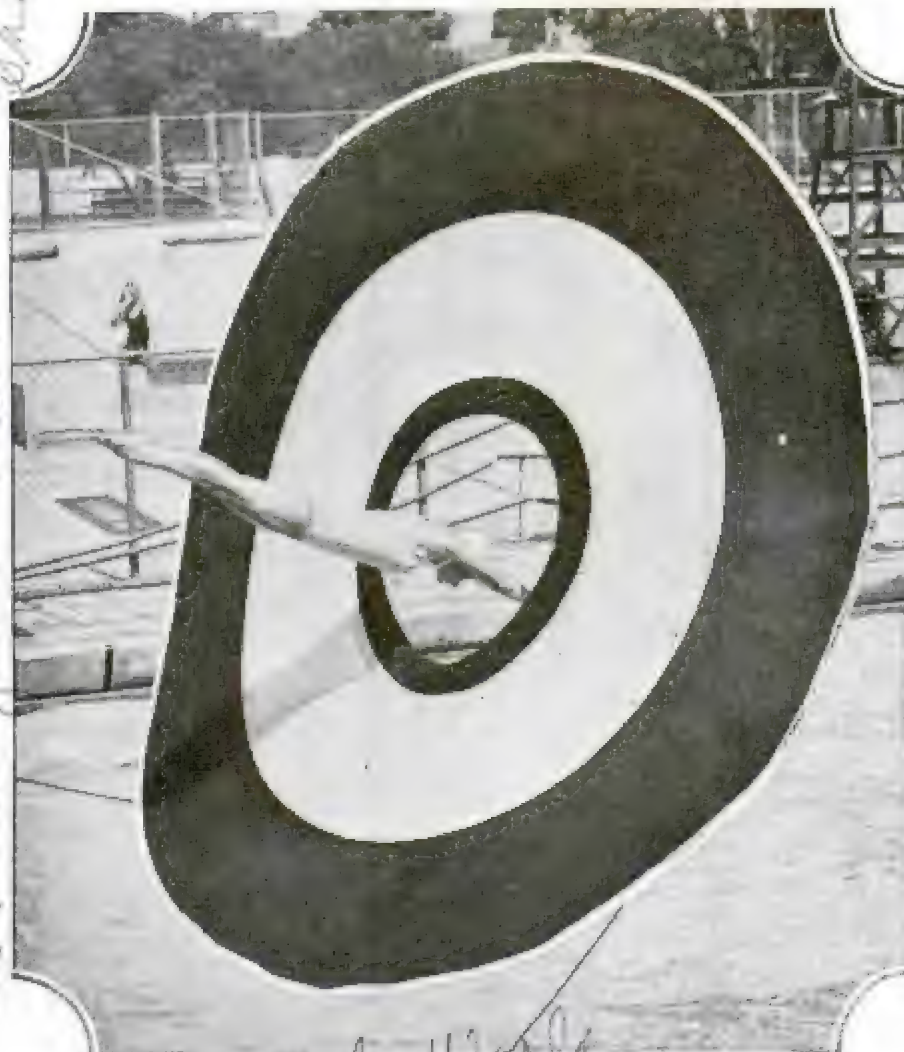
*Cities and expositions after dark furnish fascinating subjects. Sunlit water is turned into molten moonlight by the camera*

Picture making by moonlight, too, is a most interesting branch of photography. The beautiful results are worth the extra care necessary in exposure calculation. The quality of light cast by the moon is of a softness which gives added charm to pleasant scenes and graciously subdues the unlovely features of views more or less commonplace by daylight. To play up the moonlight effect properly, it is well to give an exposure

(Continued to page 140A)



## Diver Hits the Bull's-Eye in a Twelve-Foot Target



Here is a diver making a "hole in one"—a neat plunge through bull's-eye of twelve-foot target suspended over a pool at a swimming exhibition

Diving through the open "bull's-eye" of a huge target is the latest novelty at swimming shows. The twelve-foot target is suspended over the water and expert divers can make a clean plunge through the hole at the center.

## Plane Fallen at Sea Dyes Ocean to Mark Site of Wreck

Staining the ocean a vivid color to mark the spot where a plane has fallen is proposed by a French inventor, whose method was demonstrated recently by engineers aboard a submarine in the Mediterranean. A plane forced to descend at sea, floating helplessly, could drop overboard boxes of tiny reed cylinders encasing a powerful luminescent dye. Spread over the surface,

a small quantity of this dye in actual test was visible more than a mile from the deck of a submarine and for nearly ten miles from a plane searching overhead. Its spread is slowed by cotton wads in either end of the cylinder, and the inventor estimated that a twenty-pound load cast into the sea would stain the ocean over a wide area sufficiently to attract attention for twelve to fifteen hours.

## Army Bugler Hears Mechanical Bugle Blow Reveille

It isn't the army bugler who gets up first in these days of mechanized armies—it's the control tower operator who "blows" reveille. A mechanical bugle blows the familiar musical calls at the Mitchel Field, N. Y., air base. It consists of a phonograph with crystal pickup, amplifier and loudspeakers.



This army bugler is wondering if he is out of a job now that the loudspeaker can blow the calls



# Merry-Go-Round Serves a Shine as You Ride

Shoeshines are now turned out while you ride on a merry-go-round. You climb three steps and take your seat on one of the eight chairs. As the platform revolves, six "specialists" shine your shoes, each handling his own particular step in the process. The first attendant cleans the shoes, the next applies polish, the third handles an electric brush, the fourth uses a hand brush, the fifth polishes with a hand buffer and finally the dressing is applied.



As this shoeshine platform makes one revolution, six bootblacks take turns at their specialties of applying polish, cleaning or buffing shoes

## Electric Current from a Lemon Is Recorded on Ammeter

It would take bushels of lemons to light your house, but experiments recently demonstrated that a lemon is a source of electricity. "Spades" of copper and aluminum were inserted in a lemon and attached to instruments, and the fruit yielded a current of about one-half volt, and .0002

ampere. The strength of the current varied in other lemons. W. Parmelee West, curator of electricity and communications at the Franklin Institute in Philadelphia, estimated, taking into consideration the internal resistance of the lemons and other factors, it would require 800 lemons to light a two and one-half volt flashlight bulb.



Reading the "current" from a lemon on ammeter connected to metal "spades" inserted in fruit

## Light Fixtures Screw in Ceiling Saving Cost of New Wiring

Electric-light fixtures which simply screw into an existing socket in the ceiling are now available. A bowl fixture for semi-indirect lighting, for example, adds to the appearance of the room and is furnished ready to screw in, eliminating the cost of changing wiring.



Aluminum can be colored by an electrical process which makes the color a permanent, integral part of the metal and renders the aluminum non-corrosive and insulated against current up to 500 volts.

The Engineer (England)

21637  
1523 S. 10th St. St. Louis  
Kwik-Shine  
21645  
362  
Light Fixtures Screw in Ceiling  
Saving Cost of New Wiring  
Screw in socket. Pastelite  
Electric-light fixtures which simply screw into an existing socket in the ceiling are now available. A bowl fixture for semi-indirect lighting, for example, adds to the appearance of the room and is furnished ready to screw in, eliminating the cost of changing wiring.  
Aluminum can be colored by an electrical process which makes the color a permanent, integral part of the metal and renders the aluminum non-corrosive and insulated against current up to 500 volts.  
The Engineer (England)



# Chemical Preserves Butterflies for Decorations

Right, some of the butterflies after special treatment. Bottom, right, how butterfly is worn as an ornament. Top, left, workers applying chemical to wings of butterflies. Bottom, left, a butterfly being mounted on flexible wire holder which facilitates attachment to vase, lamp shade or hats



Butterflies can be strengthened and preserved for use as decorations by a chemical treatment being employed by a British company. Brittleness of the wings after rigor mortis set in was overcome by placing the butterfly in a tin containing a small supply of crushed leaves and chemicals which made the wings supple. Then it was easy for workmen to mount the butterfly

with outstretched wings. The tiny scales, which form the "powder" which comes off on the fingers when one touches the wings, were fixed by applying chemical to the underside with an atomizer. The chemical penetrated to the upper surface, but did not destroy the glossy appearance. After the chemicals have been applied, the butterflies are mounted in various ways so that the whole insect may be used for decoration. One way is by fixing them to a tiny holder to which is attached, underneath the insect's body, a long flexible silk-covered wire. This wire may be twisted around the stem of a flower in a vase to

Dorsey Butterfly Farm, Kent, England



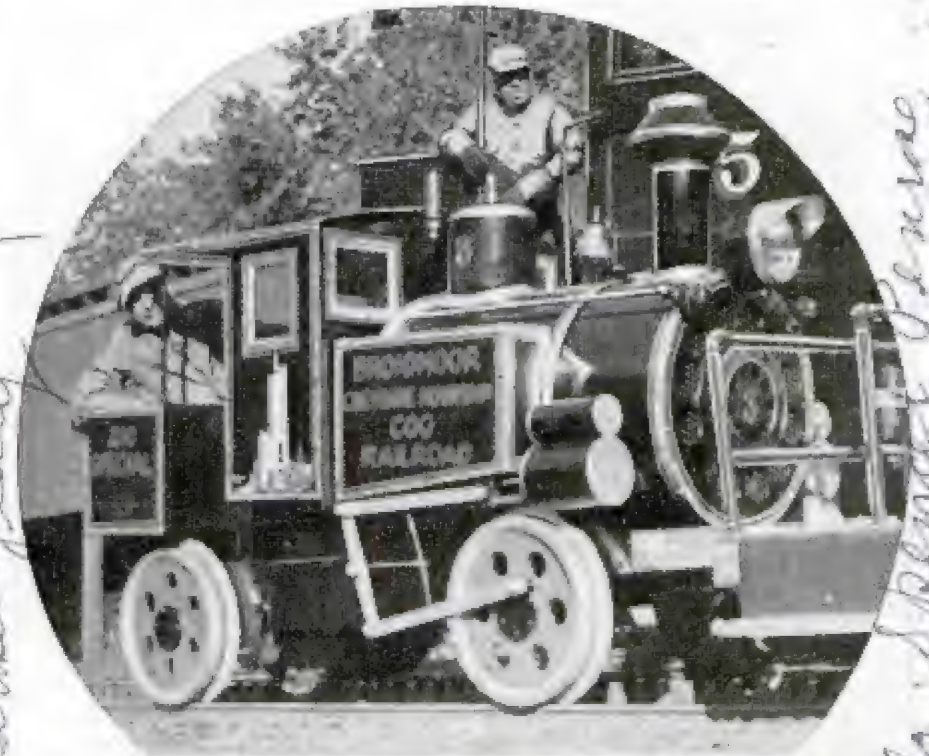
give the appearance of a butterfly alighting. The butterflies also may be attached to the metal framework of a lampshade. Another use is on women's hats. During the recent coronation in London, the butterflies were used for jewelry and for attaching to bouquets.

### Use of Atom Power by Industry Seen within Lifetime

Already it is known that matter can be converted into energy, and scientists believe that within the lifetime of living men the power of the atom nucleus may be put to practical industrial purposes. Prof. E. O. Lawrence of the University of California, who has transmuted elements from one form to another in his cyclotron laboratory, sees no immediate prospect of releasing the subatomic energy for useful work but asserts that "the establishment of the great principle of the equivalence of mass and energy is none the less of great practical importance. It is probable that in your lifetime and mine this great principle will play a vital role in technical developments which you and I at the moment are not even dreaming of."

It takes 600 billion gallons of water a year to quench the thirst of America's steam locomotives—enough to fill two channels 100 yards wide, nine feet deep, from New York to San Francisco.

## Miniature Sightseeing Train Climbs Mountain on Cog Line



Miniature cog train beside big brother of Pikes Peak line, and close-up of tiny gasoline engine that pushes passenger cog up Cheyenne mountain.

Little brother of the famous old cog railway train that takes tourists up to the summit of Pikes Peak in Colorado, a miniature train has been built to carry sightseers from Colorado Springs part way up Cheyenne mountain. Like the big cog engine, the baby one pushes the passenger coach ahead of it; but the Pikes Peak locomotive is steam driven, while the little engine is gasoline powered. Its cog wheel meshes with a cog rail in the middle of the narrow-gauge track. The locomotive is high-hipped so that it rides level while climbing the mountain grades. The upper terminus of the baby cog train is a promontory overlooking the Cheyenne mountain zoo.

Railway Age 6/5/37

Science Service 6/11/37

Verdeley, Calif.

Spent 4 hours in Colorado Springs, Colo.



Reference.  
 Robert L. Peary, Publicity Director  
 Paramount Studios, 5401  
 Hollywood Blvd., Los Angeles, Calif.

10 5 5 5 / Holman "Gie"  
 Los Angeles, Calif.

# ODD JOBS

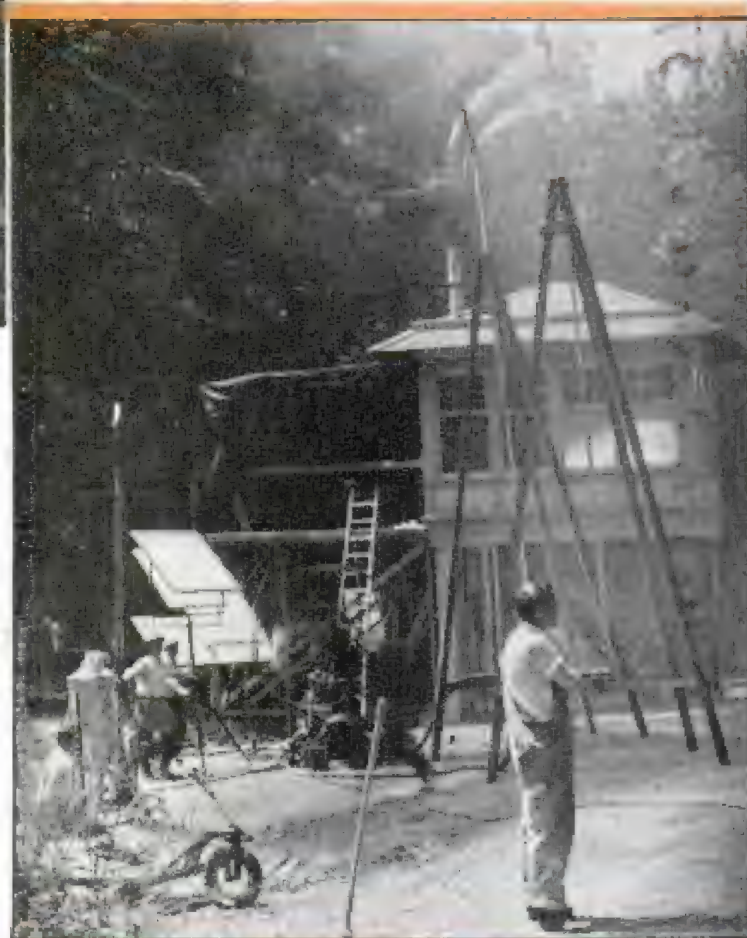


even if the film reduces everything to black and white. A change in color changes the shade that registers on the film.

Another ally of the director is the hat straightener and the lampshade tilter. To the single eye of the camera, pointed from some odd angle, hats, lampshades, and pictures that have really been placed straight appear to be distorted. Before any scene is filmed a property man makes the rounds of the set, tilting things awry so they won't look that way.

**H**AVE you ever heard of a pants un-presser or a hat straightener? What does the greening man do? How does a professional high-light killer earn his living, and what are the duties of a sky maker?

Queer as they sound, these are regular jobs in Hollywood. Nowhere else, perhaps, could a greening man carry on his trade, but he is pretty important inside a lighted motion-picture sound stage. When shrubbery and foliage and even a few large trees are carted inside a sound stage the director has to keep his eye on the leaves. The intense heat from the lights is apt to turn them brown after a short time. Then the greening man goes to work. From the top of a stepladder he sprays green paint all over the foliage and restores it to its natural color. No one knows better than the director that the right colors are important



Top, Universal actors ready for stationary auto-ride picture. Bottom, tall sprinklers, wind machine and hose are used to produce a realistic rainstorm in the movie "Westbound Limited"



# of HOLLYWOOD



*Top, "taxidermist" creates hollow donkey's head for use in Warner Brothers-First National picture while actor looks on*

Sometimes people on the sidelines of a picture are set to chasing echoes. In a sound sequence odd echoes may reverberate and spoil the conversation being recorded. Before the scene can proceed the echoes have to be spotted and taken out. Usually it is merely a matter of changing the angles of the walls of the set or hanging up draperies to deaden the sounds.

The pants unpresser goes to work when an actor must be shown wearing clothes in which he was supposed to have slept the night before. Occasionally a director assigns one of his men to killing high lights. Glass windows, vases, glass furniture, and highly polished surfaces may be reflecting a glare that is picked up by the camera. High lights on vases are dulled with an application of liquid wax. Mirrors are tilted so they do not reflect in the camera. Glass doorknobs are sprinkled with chalk dust to prevent them from sparkling with reflected light. Now and then a highly polished surface must be polished even more





for the camera. When a rubber plant, for instance, should glisten more than it actually does, mineral oil is sprayed over its leaves to achieve the effect.

The property man has one of the most exacting of all jobs. It's his business to assemble every article that might possibly be needed in a picture and in addition have on hand every item that might be required in an emergency. He has charge of a large portable cabinet containing drawers filled with a five-and-ten cent store collection of everything from matches to hairpins and needles to playing cards. Part of his standard equipment is a spray gun filled with fly spray with which he sprays the plates of food used in dining-room scenes. Most motion-picture food is real and might attract flies that would be photographed by the cameras if it were not for the spray.

The sky maker is usually a "rag man" from the drapery department. When a dull sky or a misty dawn is needed he creates it with a backdrop of the right shade, dyeing as many as 1,500 yards of muslin for a big scene. He may be called upon to build up imitation but realistic clouds out of framework and cotton, or to erect a brown tent in which night scenes are to be filmed.

In other departments of the studios are professional letter writers, professional screamers, and the people who select the names to be used by the characters in film stories. Choosing screen names is hard

because the studios try to avoid name combinations actually used by living people. Often this is impossible and to make doubly certain that they will be treading on no one's toes the studio may go out and buy a name when it has to christen a villain or some obnoxious character in a story. Usually a studio employe will release the use of his name for the purpose. Stars rarely if ever write the letters or sign the checks they scribble on the screen. When a close-up of a letter is to be shown the details are

sent to the insert department where a professional letter writer with a handwriting that may be modified to show youth, culture, or any other desired characteristic pens the lines in a large clear hand. Pro-



Top, whittling out animal figures for Noah's Ark scene in "Green Pastures." Bottom, creating rain-storm in Universal's "Wings Over Honolulu"





professional screamers are used in horror plays when howls and screeches are needed. Some people are able to produce blood-curdling shrieks. They scream for the sound tracks and are heard but not seen in the picture.

On the fringes of Hollywood are a number of movie merchants who do



*Top, studying model of set before shooting picture. Center, tearing down parts of foreign village to give war-torn appearance in Universal picture*



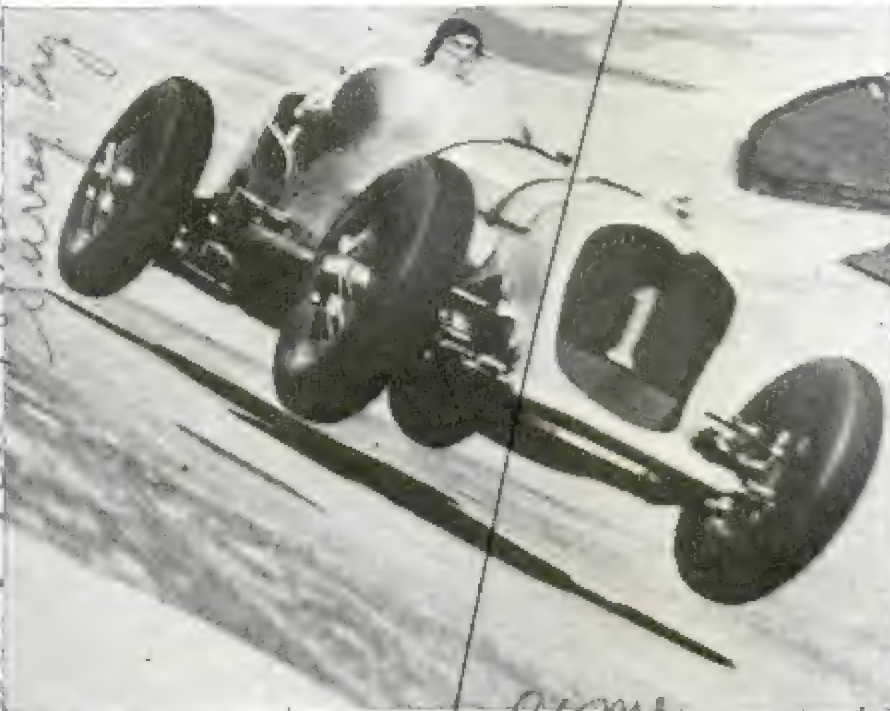
*Bottom, "smoke man" at Warner Brothers-First National spraying smoke into cannon mouth*

a thriving trade in such commodities as fake jewelry, ancient automobiles, and war medals. Each collects some such item and when a studio finds need, say, for half a dozen old French taxicabs, the property man turns to his list of free-lance collectors. One man has a fleet of fifty ancient cars while another specializes in collecting and renting to the movies old-time cars of foreign makes. A bookseller built up a big business supplying the studios

(Continued to page 118A)



## Four Wheels Leave Ground as Racer Rounds Fast Turn



For at least a fraction of a second this racer took the turn on no wheels at all, and the camera was there to prove it

Whirling around the high-banked curve of an English track at high speed, all four wheels of a racing car left the ground just as a cameraman snapped the action. Daredevil driving like this brought car No. 1 to the finish line in third place.

## Permanent Magnet Is Useful in Home and Industry

Many applications in the home and in industry are found for permanent magnets made of metal alloys inexpensive enough to permit their use in low-priced products. In the instrument field a speed-recording tachometer, actuated by such a magnet, was used on a passenger locomotive operating every day for two years. Cathode-ray oscillographs, electro-cardiographs, electric gauges, aircraft instruments and geophysical instruments employ similar magnets. One of the most valuable applications is as a blowout agency in circuit-breaking devices. Others include searchlight control, subway train-door control, thermal relays and control for electric trolleys to minimize breaker noise. Applications of the magnet to products used in the home include the electric refrigerator,

ator, oil furnace, gas furnace, household circuit breakers, radio loudspeakers, electric clocks, phonograph pickups, percolator tops and devices to stop the rattling of windows and doors. General Electric engineers are finding new uses for these magnets, which are manufactured from an alloy called Alnico which is said to provide more power in a small space and at lower cost than any previous type of permanent magnet.

## Flier Climbs Nearly Ten Miles for New Record

Climbing to an indicated height of 51,361 feet above sea level, Col. Mario Pezzi, of Italy, recently established a new altitude record for heavier-than-air craft. Instruments in his biplane recorded a temperature of sixty-five and two-tenths degrees below zero during the flight. The previous airplane altitude mark was 49,944 feet, set by Squadron Leader F. R. D. Swain of the British Royal Air Force.

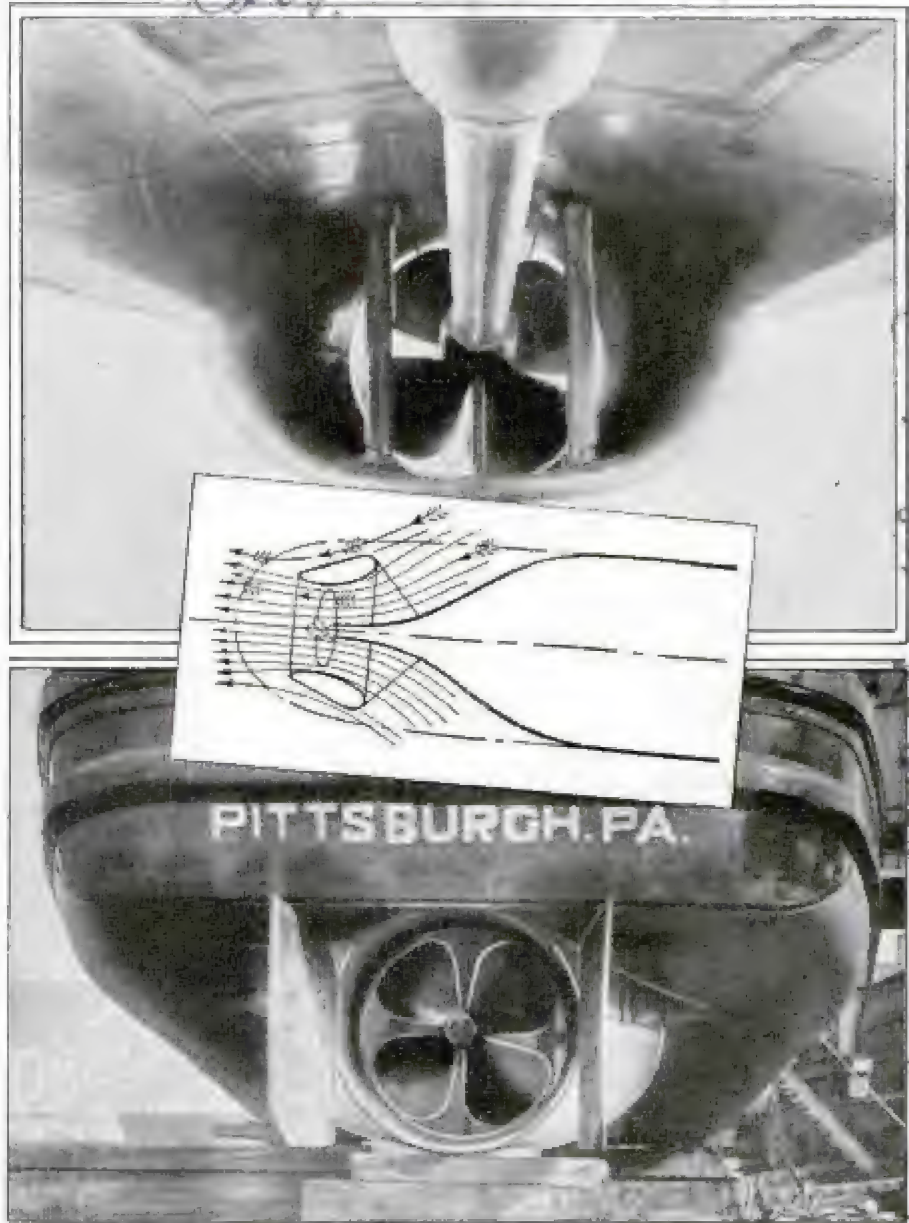


Col. Mario Pezzi, Italian, masked and helmeted for flight that set new ceiling record for airplanes



# Nozzle Around Boat Propeller Adds to Power

Consisting of a structural steel ring which controls the amount and velocity of water drawn through the propeller, the Kort nozzle is being tested in this country as a means of increasing the efficiency of vessels engaged in towing or other heavy duty. First demonstrations indicate that the nozzle may be expected to add considerably to the effective thrust at speeds below four miles per hour, providing quicker acceleration. At normal towing speed general performance is improved. The nozzle, developed by L. Kort of Germany, is attached to the hull of the vessel in a manner to surround the propeller, and forms a cylindrical tube immediately around the wheel. The forward nozzle body has a broad airfoil section flaring open from the propeller, with the external section tapering to meet the inner tube aft of the propeller. Direction and velocity of water driven by the propeller



Top and bottom, two views of propeller with the Kort nozzle installed. Sketch shows how water is drawn through the nozzle

are controlled in such a way that maximum forward thrust is obtained from the column of water driven out by the wheel. The added thrust is not important in the case of a free-running vessel in calm weather, but becomes increasingly effective as the amount of slip increases, as in the case of towboats, tugs, trawlers, vessels traveling in restricted waters such as canals, and deep-sea vessels working against head winds or heavy seas. In tests on vessels in foreign countries, where horsepower ranged from fifteen to 1,500, an increase in towboat pull of twenty to thirty-five per cent was obtained at normal towing speeds. The nozzle also reduces the likelihood of lines fouling in the

propeller and prevents the entrance of ice cakes large enough to damage the propeller wheel of boats working in ice.

## Glass Made from Potato Starch Can Be Sawed and Drilled

Potatoes are the source of the latest substitute for glass or celluloid. A Dutch engineer, aided by chemists, has produced from the starch of potatoes a transparent substance which can be drilled, sawed, turned and laminated. The material allows the passage of ultraviolet rays, does not burn readily, and the cost of production is said to be low.

no further information

es 90 2.

Van Lunge

L. Kort Corp. 4801 Neville Island, Pittsburgh, Pa.

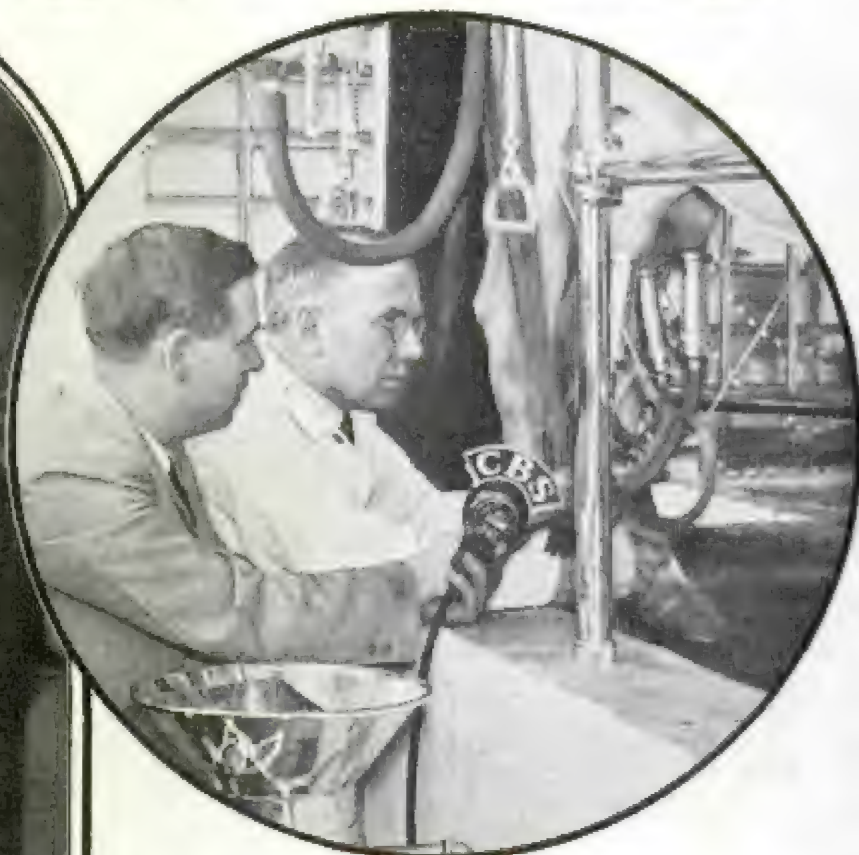
Automatic Industries 6/19/27



# HOT NEWS



Wrist watch of walking radio reporter is microphone; cane contains antenna and leather case holds batteries. In circle, broadcasting sound of milking



**R**IDING the air "like a great feather," the mighty "Hindenburg" floats toward its mooring mast at Lakehurst. In a near-by hangar Herb Morrison watches the giant against the sky and talks to a microphone. Radio announcer and aviation enthusiast, he has been sent by station WLS, Chicago, to record on a wax disk the arrival of the dirigible.

"The ropes have been dropped, and they have been taken hold of by a number of men on the field. It is starting to rain again. The back motors of the ship are holding it just enough to keep it—

"It's burst into flame! Get out of the way!"

The blast of exploding hydrogen gas knocks the needle from its track and etches a squawk into the record. The announcer's voice rises excitedly.

"Get this, Charley," shouts Morrison to radio engineer Nehlsen.

"Get out of the way, please. It is bursting into flames. This is terrible! This is one of the worst catastrophes in the world. The flames are 500 feet in the sky. It is a terrific crash, ladies and gentlemen. It's in smoke and flames now.



# Broadcasting System, Inc. 410 N. Michigan, Chicago on the AIR

Right, reporter and engineer who "covered" the "Hindenburg" disaster with their portable recording set. Below, in the "news room" of a radio chain on election night while returns are tabulated on board



spectators. This is no staged drama. The radio reporter has stumbled upon a terrific scoop. He alone was at the "mike" when the tragedy broke. The cry in his throat, the undertone of panic sounds, told the story better than the carefully chosen phrases of a calmer man could. When that record, finished with a breathtaking description of the accident and interviews with some of the survivors, was broadcast the next day from the Chicago studio it became

an unparalleled radio scoop.

It is a rare thing for the reporter to be on the spot when a thrilling, unexpected story breaks. But the radio reporter is always ready. While Herb Morrison dictated to a disk, flashes went to the "news desks" of the radio chains and "special events men" whirled into action. Barred from immediate access to the air field,

"Oh, the humanity!"

Morrison's voice breaks.

"Those passengers and—I can't talk, ladies and gentlemen. Honest, it is a mass of smoking wreckage. . . Listen, folks, I am going to have to stop for a minute because I have lost my voice."

In the background you hear the rumble of explosions, the shrieks of hysterical





*Left, a flying radio reporter obtains an interview in an airplane circling over the scene of a disaster. Right, field engineer "caddies" portable transmitter, batteries and mast antenna in covering remote story*

radio men went up in planes to circle over the scene, broadcasting with short-wave sets. "Background" men wrote historical sketches of the "Hindenburg," its builders, its officers. Survivors, noted airmen, special writers and officers were interviewed. The radio news men "blanketed" the story.

The special events man is the "city editor" of radio. He is the first man called when important news breaks. He is the man who commands the staff of radio reporters, commentators, continuity writers, engineers, stenographers, announcers, drivers and message runners; who plans the coverage of predictable events such as the coronation, election, track meet or world's fair.

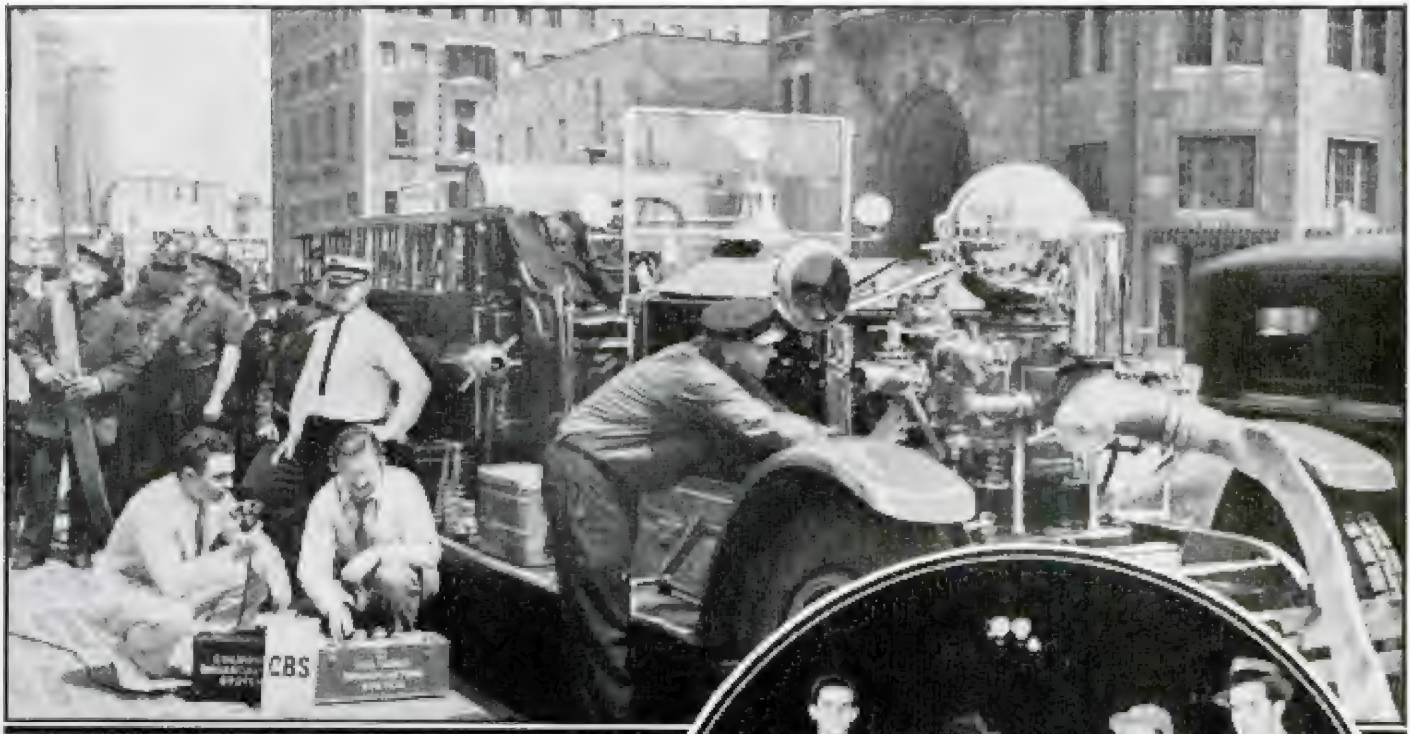
When an electric interurban train speeding along the elevated right of way in Chicago last November crashed into a local "L" train, killing and injuring a score of passengers, Hal Burnett of the Columbia Broadcasting system staff was at home listening, as a radio man should, to his radio set. He heard the first flash of the wreck. Burnett rushed to the studio and organized his "remote" crew—three announcers, a news writer, three engineers, a page boy, a telephone company official, a WBBM press man, and two mobile short-wave broadcasting units.

Twenty minutes after he notified the telephone company, the lines were up on a garage roof adjoining the scene of the elevated wreck, and three minutes later Columbia was on the air with a dramatic recital of the collision, told from the roof and from the track itself, with the crashing of firemen's axes, the sirens of ambulances, the hum and crackle and rasping of torches and saws cutting steel girders for a realistic background. CBS had a scoop at the scene of the wreck. Meanwhile at the hospital where victims of the accident were taken, the radio reporters for National Broadcasting company scooped the story from another angle, with bedside microphones picking up interviews with survivors.

What pictures are to the newspaper, sound is to radio. In the studio, sound effects can be produced "tailored to order." Not so in the field. The radio reporter must develop a "nose for sound"—genuine sounds to add to the realism of the broadcast. Herb Morrison didn't have to fake the chorus of screams at Lakehurst. Hal Burnett saw to it that his mikes were close enough to pick up the noise of ax and ambulance on the "elevated."

"Look for sound!" reads one of the commands posted for the guidance of radio





reporters in Columbia's news room at Chicago.

"Look for sound! Authentic sounds tell the story far more vividly than any word pictures you can create. Get your microphone as close to the source of sound as you can, but don't fake, or grossly exaggerate, sounds."

Before that bit of advice was written, the radio reporters covering the escape of Dillinger's mob from prison in Indiana picked up a bit of unscheduled sound they hadn't figured on.

The convicts had called at a farmhouse to demand food, then cut the telephone wires and fled to a near-by wood, where state police pursued them. The radio men had the telephone line repaired in a jiffy, hooked their portable broadcasting set to the wire and called the Chicago studio. As they gave the listeners a running account of the man hunt, police motorcycles sped up to the mike, sirens screaming. In the excitement, vigilantes fired several shots close by, adding a touch more theatrical than intended. But the rat-tat-tat of the machine gunfire that followed was totally unexpected. The broadcasters

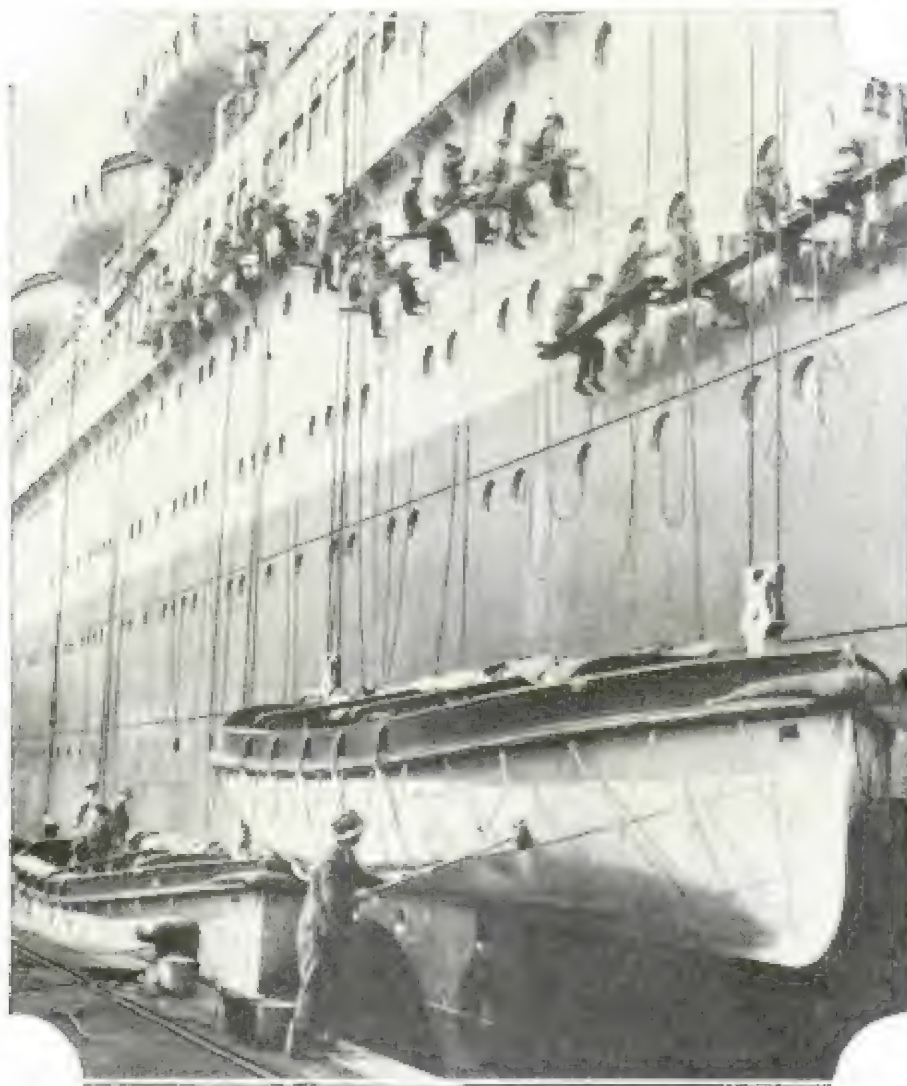
(Continued to page 114A)



Top, portable transmitter at fire-department demonstration. Center, radio reporters and engineers starting for flood-stricken region. Below, to bring you the roar of Niagara Falls, microphone is mounted on long pole and extended over very brink



## Painters Dangle from Decks to Dress Up "Queen Mary"



"Queen Mary" and her lifeboats undergo a scrubbing. Painters swarm over the sides of the British liner prior to its first anniversary voyage

Just before the "Queen Mary" sailed for America on her first anniversary voyage, painters swarmed over her sides to give the big liner a "brush up." Lifeboats were lowered to the level of the dock, and painters dangled along the side of the ship for a speedy going-over with pail and brush.

## Big Generator for Auto Plant Adds to Giant Power

Intended to increase the vast power output of the Rouge plant, a 110,000-kilowatt generator will be installed by the Ford Motor company, raising the capacity of that unit to 375,000 kilowatts without enlarging the powerhouse. The generator will be sixty-six feet long, twenty-four

feet eleven inches wide, and twenty-two feet three inches high. It will weigh 2,000,000 pounds, and will rest on a concrete foundation weighing 1,800,000 pounds. The condenser will contain sixty-three miles of tubing which will carry 125,000 gallons of cooling water per minute. The new high-pressure boiler will be twenty-five feet eight inches by thirty-two feet and will tower 115 feet five inches to the top of the Rouge powerhouse. Weighing 9,000,000 pounds, the boiler will contain twenty-five miles of boiler and super-heater tubes.

## Automatic Grinder for Drills Does Quick Job

Sharpening drills is a swift job for an automatic grinder recently brought out. Fastened to any bench, it can be adjusted for sharpening drills from three thirty-seconds to one-half inch in diameter.



In two minutes you can sharpen a drill with this automatic grinder, which fastens to workbench

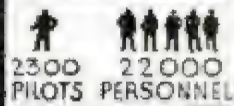
Atlas Press Co.



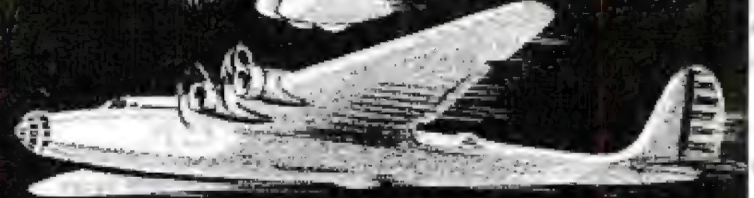
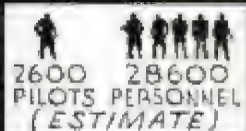
# World's Powers Race to Build Up Air Fleets

## AIR POWER REPRESENTED BY TYPICAL BOMBERS

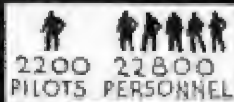
**JAPAN**  
2000 PLANES



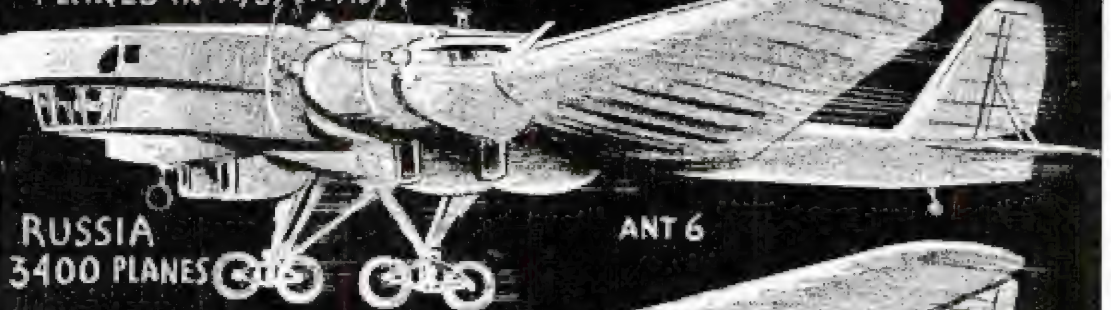
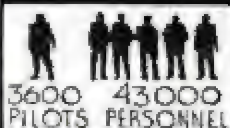
**UNITED STATES**  
2200 PLANES  
676 TO BE ADDED IN 1937



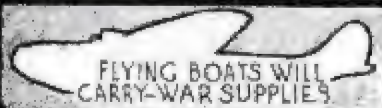
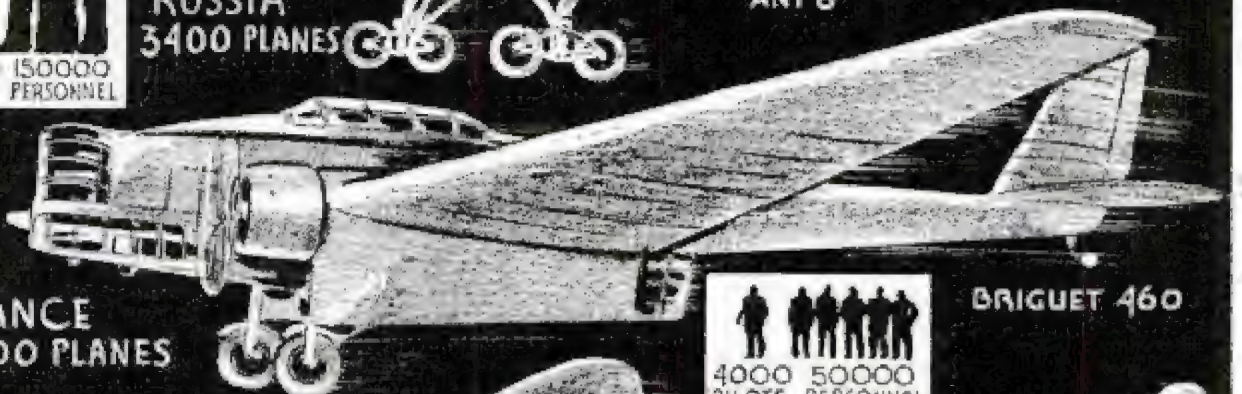
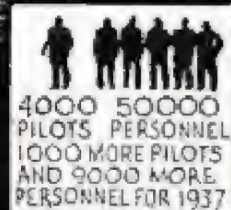
**GERMANY**  
3000 PLANES



**ITALY**  
3200 PLANES



**FRANCE**  
3600 PLANES



**BRITISH EMPIRE**  
4000 PLANES



HANDLEY PAGE "HARROW"

These sketches and figures indicate the air fighting strength of the world's great powers at the start of 1937. Germany, Russia and Italy are hastily adding more planes, 2,000 new aircraft being scheduled by Italy for this year



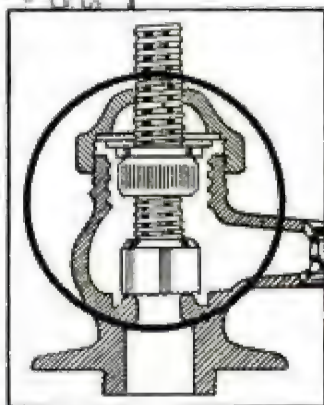
## Bundle Is Tied with Wire at Touch of Foot Switch



Newspaper bundle is tied with wire at touch of foot switch and then shoved on to conveyor to be shipped

Wire-tying machines today wrap bundles of newspapers for shipping in less time and at less expense than the old method of tying with rope. The operator places a bundle in an opening, touches a switch with his foot, and the machine packs the newspapers compactly, wraps a wire tightly around them, ties and cuts the wire.

## Faucet Reamer Repairs Valves Reaching Hidden Fixtures

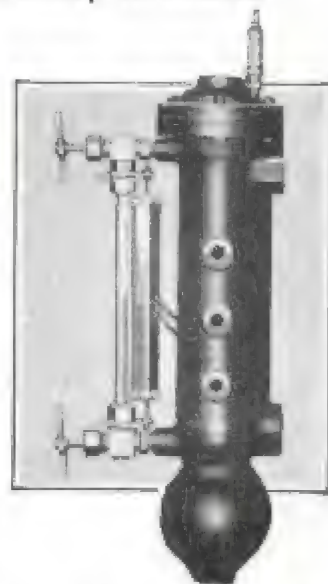


Provided with a long shaft so that hidden bath fixtures can be reached easily, a steel faucet repair tool is available for reaming valve seats smooth when new washers fail to stop leaks. The

reamer quickly removes cuts or crust from the valve seat. Inserted in the faucet in place of the stem, an adjustable nut bears against the packing cap and creates an automatic feed when the handle is turned.

## Neon Light on Water Gauge Makes Level Easy to Read

To make it easy to read a water-level gauge from a distance, a neon-tube light can be installed behind the gauge. A magnifying glass is attached, and the water-filled part of the boiler-level gauge stands out as a broad red band, while the empty space above the water line ap-



pears as a hairline red stripe. Thus the water level can be seen day or night.

## Stamp and Letter Moistener Speeds Up Mailing

Designed for moistening of both the envelope and the stamp, a handy and inexpensive moistener is available to speed up



Using the combination stamp and envelope moistener. Note how envelope is sealed

Hans Erik Meier

Edward O. Mally Valve Co  
11415 S. Michigan, Chicago  
315 W. Woodbudge  
Detroit Mich  
Es 585  
Es 694  
Es 666  
No 11 of capital letter  
Leifsg 21, Germany



mailing. Long strips of stamps may be moistened rapidly by means of a small white roller, the under side of which contacts a short feed wick extending to the bottom of the glass water container. The envelope flaps are moistened by a longer wick, in a rubber tube, ending in a handy tip that is used like a pencil.

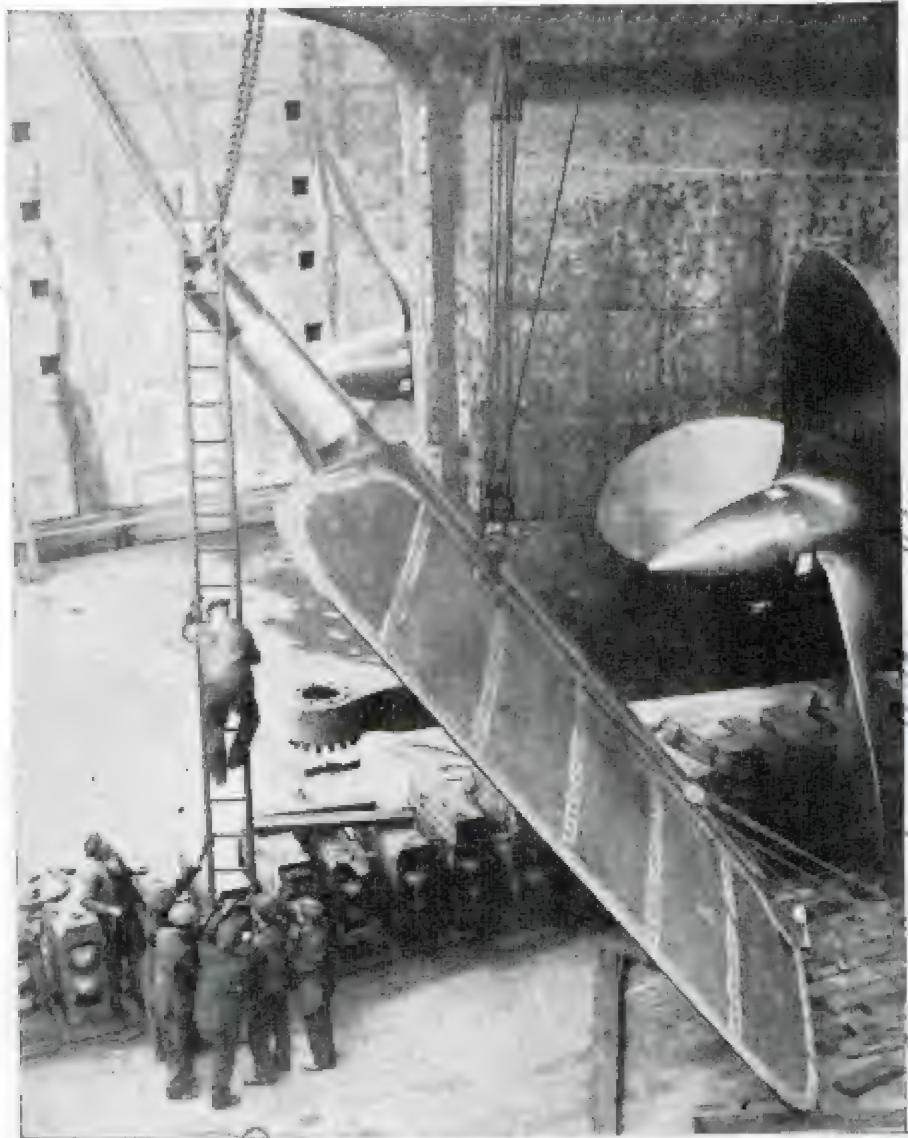
### Super-Speedboat for Hundred and Fifty

Designed to accommodate one hundred and fifty passengers, a super-speedboat is being constructed in Soviet Russia. A model, displayed recently in Paris, shows that the craft will be fitted with six engines, four of 675 horsepower and two supplementary aviation motors. Cruising speed will be about fifty miles per hour. Measuring sixty feet in length and thirty feet in width, the craft will be placed in service to carry vacationists between the two resort cities of Sochi and Sukhum on the Caucasian shores of the Black sea.



This is a model of the super-speedboat which is being constructed in Russia for transporting vacation crowds on the Black sea

## Putting Eighteen-Ton Rudder on Big Liner Is Ticklish Job



Handling this eighteen-ton rudder requires skill and here we see the workmen going about the job carefully to prevent accidents

Installing an eighteen-ton rudder on a ship is a ticklish job, due to the weight and to the skill with which the tackle

and supports must be handled to prevent damage to rudder and to the vessel. Such a rudder was attached successfully to the 25,000-ton Union Castle liner, "Arundel Castle," recently when that ship was being overhauled at Belfast.

☐ You can get more light from five cents worth of electricity than from a dollar's worth of kerosene.

Stone and Webster

B. D. June 1937

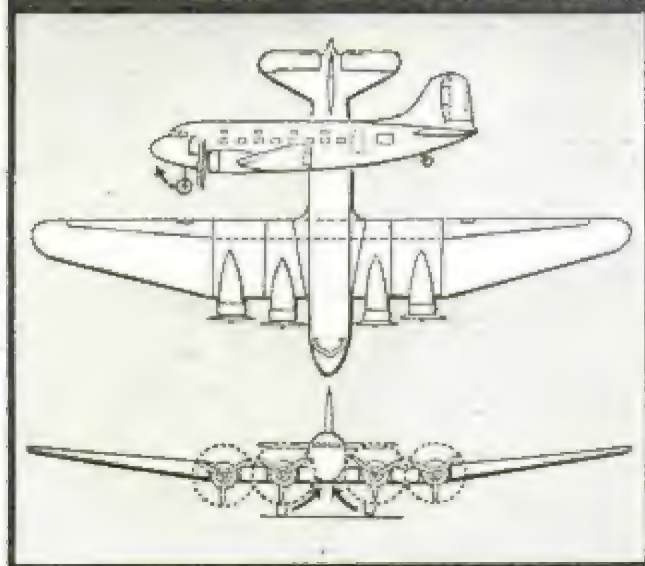
Harland Wolff yard.

at messrs



Es H. Amr. Elm. Rademan  
4 W. 103rd. New York

# AROUND *the* CORNER



Above, the twenty-five ton "China Clipper." Left, how tomorrow's transport may be expected to look, complete to nose wheel, folding landing gear and smooth under surface.

size. The two major clipper-ship builders of America, Glenn L. Martin and I. I. Sikorsky, have plans ready for the immediate construction of clipper ships twice as large as the "China Clipper."

Sikorsky declares that he can begin production on a sixty-ton ship with a range of more than 4,500 miles and a speed of not less than 160 miles per hour. This permits a non-stop flight across the Atlantic in about twenty-four hours. She will carry a payload of ten per cent of her gross weight, amounting to 12,000 pounds. This figure compares favorably with the payloads of first-class steamships and railroad

**T**OMORROW'S airplane land transport is described by engineers as having a gross weight of about twenty tons, a useful load of about six tons, a flying range of 1,250 miles, and a speed of 225 miles per hour on two engines. For water transport, the principal development is increased



# *in* AVIATION



*Circle, Designer Sikorsky in flying laboratory. Bottom, one of the four-motored Boeing bombers being built for U. S. army. It has 105-foot wingspread and weighs sixteen tons*

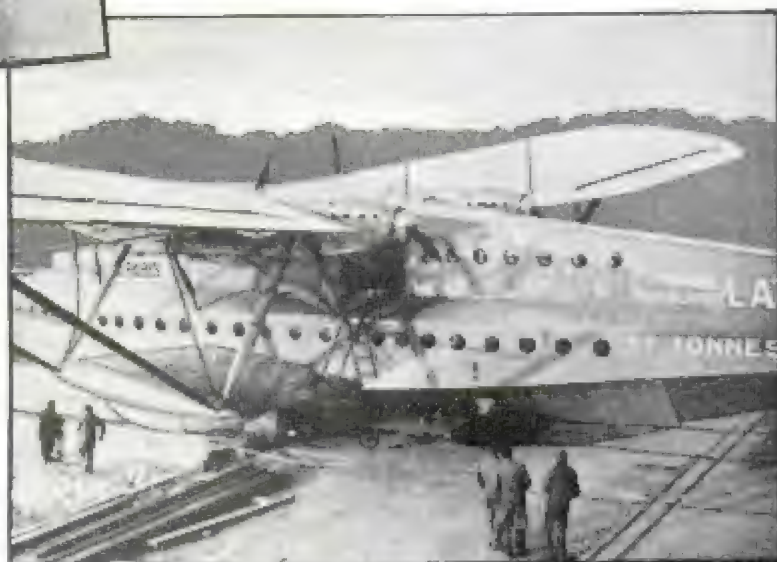
trains. Sikorsky's plans provide luxurious accommodations for fifty passengers, including dining saloon, galley, smoking lounge, and luggage space.

Details of the projected superliner have been worked out carefully in Sikorsky's factory. In this double-deck transport, the dining saloon amidships will have seats for twenty people and enough room to spare

for a dance floor. From the dining saloon a staircase will lead to a "flying balcony" with a bar and cocktail lounges recessed into the wings, from which one may observe the ground through windows.

One of the prime considerations in building aircraft is the factor called "wing loading." You can figure out the wing loading of an airplane if you divide its gross weight





*Top, 200-mile an hour Lockheed transport, of all-metal construction. Center, giant French seaplane "Lieutenant Vaisseau" of Paris. Bottom, another view of the big seaplane, which weighs thirty-six and one-half tons, has six motors and passenger capacity of seventy-two*

per-stability idea may be observed in nature," says Mr. Sikorsky. "The large ocean flying birds have a much heavier wing loading as compared to birds of similar size and weight that live on land. Because of their wing loading, ocean birds have an extraordinary ability to remain in the air for longer periods, even in stormy weather."

To show what progress has been made in wing loading we recall that only a few years

ago the wing loading of transport planes was ten pounds per square foot or less. Those transports behaved like bronchos in rough air, and many a passenger came down to earth with a vow of, "Never again!" The present Douglas DC-3 transports have a wing load of twenty-four and three-tenths pounds, which gives them remarkable stability in flight. The Douglas

by its wing area. For example, if you have an airplane with a gross weight of 100,000 pounds and a wing area of 5,000 square feet, its wing loading is equal to twenty pounds per square foot.

Plainly, the weight of an airplane in the air is supported by the wings. Their efficiency depends largely on their shape and area. Naturally, the smaller the wing, the lower the air resistance. Designers have striven for years to reduce the relative dimensions of wings, and thereby increase efficiency. Aside from aerodynamic improvements, higher wing loading increases stability in flight. In other words, wing loading gives an airplane greater protection in rough air and stormy weather. This implies that air-sickness may be banished on the flights of ocean transports.

"An interesting illustration of this su-

DC-2 had a wing loading of nineteen and four-tenths pounds. The new Douglas DC-4, whose development is sponsored by the five leading American domestic air lines, most probably will have a wing loading greater than twenty-five pounds when

(Continued to page 134A)



# Action and Thrills Aboard Big Racing Yacht



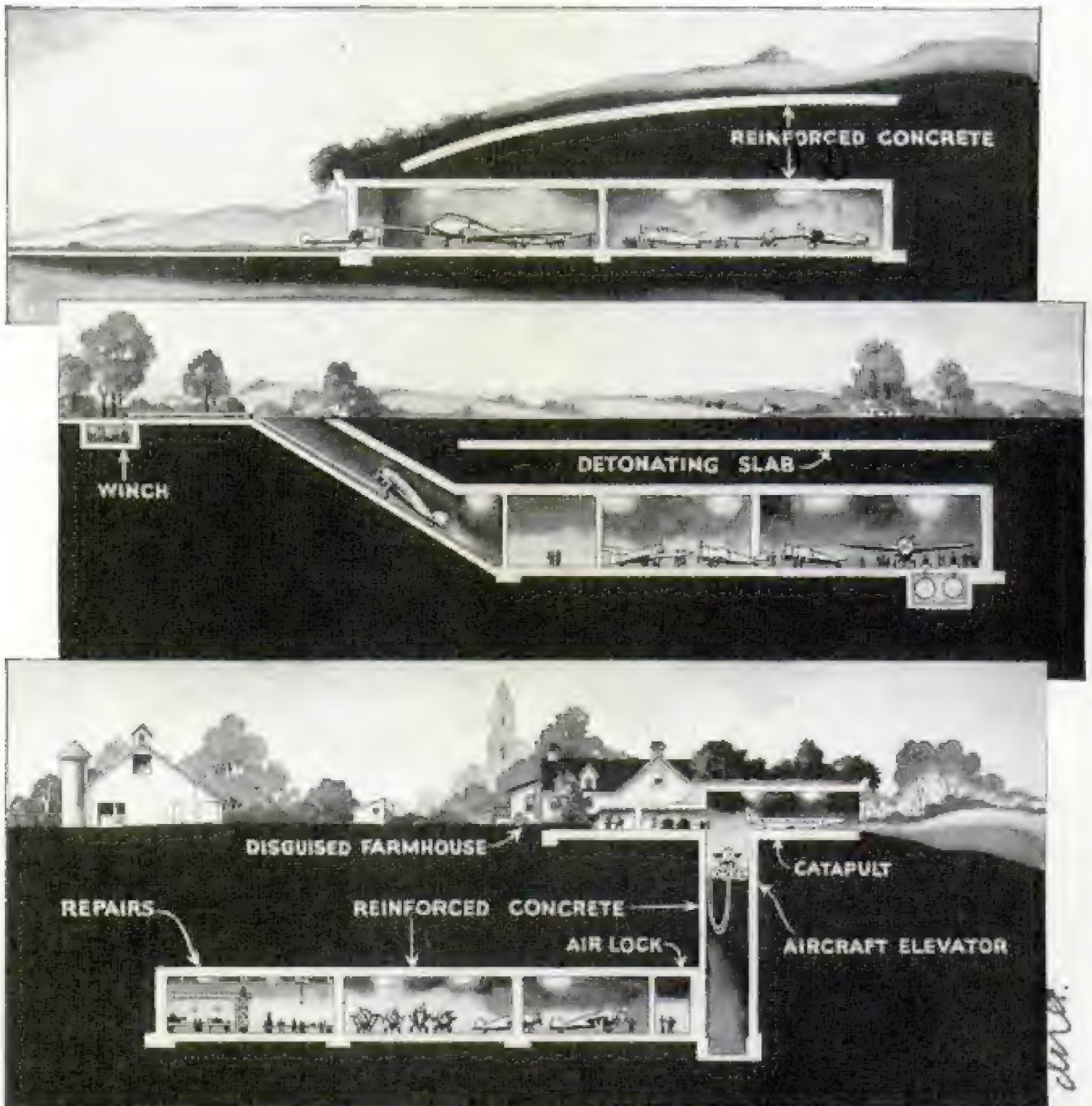
*Left, T. O. M. Sopwith, British aviation man, at the wheel of the Endeavour II, America's Cup challenger, and his wife handling the glasses during a trial spin off Newport, R. I. Below, Endeavour II presents a picture of grace and speed as she cuts through the water. It takes a fast-moving, well-trained crew and an expert skipper to get the best out of a racing yacht like the Endeavour*



*Center, it takes plenty of man-power to raise the giant sail of a racing yacht. Here we see the members of the crew of Endeavour II tugging at the line as the great craft moved out for trial spin over the race course at Newport. Left, this is another scene aboard the challenger. Skipper Sopwith is shown at the wheel, back to camera. The Endeavour was brought across the Atlantic for the America's Cup races*



# Underground Hangars to Protect War Planes



Top and center, two forms of construction used in Europe for underground hangars required in time of war. Bottom, another type, complete with aircraft elevator and catapult for launching war planes

Hangars and repair shops for airplanes are being constructed underground in Europe for use in time of war. Protection against enemy bombs and shells is afforded these underground hangars by reinforced "detonating slabs." If the roof of the hangar is level with the surface of the ground, the concrete slabs must be made five feet thick to give proper protection. This can be reduced somewhat when earth is piled on the slab. In some cases catapults are used to launch the war planes from the surface opening of the hangars.

When planes return from a flight, they are towed back to their underground nest from a near-by field where they land.

## Steering Control for Automobiles Reduces Blowout Peril

Developed to counteract steering shocks resulting from blowouts or unexpected obstacles in the road, the "hydraulic hand" steering control was demonstrated recently by the Bendix Products Corporation.

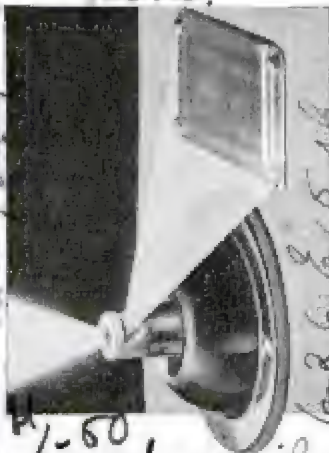
*Bendix Hyve*

*end. and south*



The test driver held his hands in the air with the car traveling sixty miles an hour while a companion fired a shotgun, blowing out the right front tire. Through the hydraulic action of the control the car was held steady on its course until the driver had time to lower his hands and apply the brakes. The control may be attached quickly between the tie rod and front axle of any auto, truck or bus.

### Lighted Push Button at Door Requires No Rewiring



Easily installed without rewiring, an illuminated push button is available for operation of the doorbell. The button is simply connected after the old one has been removed. Its light casts a ray upward toward the name plate or house number. Another beam through the front of the button facilitates writing a note or looking for the door key.

### Tiny Plane Has Wingspread of Only Fifteen Feet

Capable of cruising at 160 miles per hour, a tiny biplane completed recently for an Argentine pilot has a wingspread of only fifteen feet. It is a single-seater powered by a Douglas four-cylinder engine developing seventy horsepower.



This midget plane, whose size is demonstrated by man's outstretched arms, is capable of 160 miles per hour while cruising

## Sky-to-Earth Phone Service Offered on Air Liner



Air hostess handing telephone to passenger for new sky-to-earth service

Latest convenience available to air-liner passengers is telephone service to the earth. The phones connect by radio with the air line's station, thence to a regular telephone exchange. The service is available on the Chicago-Seattle flight.

### Synthetic Insulating Compound Resists Fire and Acid

Like rubber yet non-combustible, a synthetic insulating compound just introduced by the General Electric company can be used for coating wires without any protective covering such as braid or armor. It is highly resistant to acids, moisture, alkalis and oils, and can be produced in soft, flexible form or rigid like celluloid. Its finish is smooth, and foreign matter will not adhere to its surface.

■ An air-line pilot roaring along at 5,000 feet the other day discovered a gasoline-driven model airplane buzzing beside him.



## Shelf Rack Pulls Like a Drawer Keeping Stock in Order



Sliding rack for store shelves makes goods easily accessible and displays can be kept orderly

Storekeepers are installing racks that pull out like a drawer to keep merchandise in orderly array on their shelves. The rack is adjustable for articles of any size or shape. When one or two packages from one rack have been sold, the entire row of packages remaining may be shifted forward to present an even front, which is neat and salesmanlike.

## Case for Battery under Hood Makes Servicing Easy

Installation of the battery under the automobile engine hood, where it will be accessible for easy servicing, is made possible by a new cabinet now on the market. The case is provided with an air duct for ventilation, but during the winter this passage may be closed by shutter, so that the engine heat may raise the temperature of the battery and result in more satisfactory operation. Copper leads for the battery connections are short under this



structure of the battery and result in more satisfactory operation. Copper leads for the battery connections are short under this

arrangement, resulting in a saving on first cost and also in increased efficiency due to reduction in loss of current.

## Microphone in Umpire's Mask Broadcasts His Decisions

Soon you may hear the umpire's "Strike one!" and "Ball four, take a walk!" over the radio or the public-address system of the baseball park. A tiny microphone that fits in the umpire's mask has been developed. Connected to loudspeakers, it would make the decisions behind the bat heard throughout the grandstands and bleachers.



## "Blind Spot" Mirror for Auto Clamps Outside Car Door

For a clear view of traffic in that "blind spot" beyond the steel rear corner of your car, a small mirror installed outside the forward door is a solution. An adjustable mirror that can be clamped on in a few seconds is available. It is clamped and locked on the door without drilling or damaging the car body in any way.



Rear-view mirror and close-up of installation on front post, where it gives view of rear "blind spot"

American Forging and Machine Co.

The Andersen Co.



J. Hall

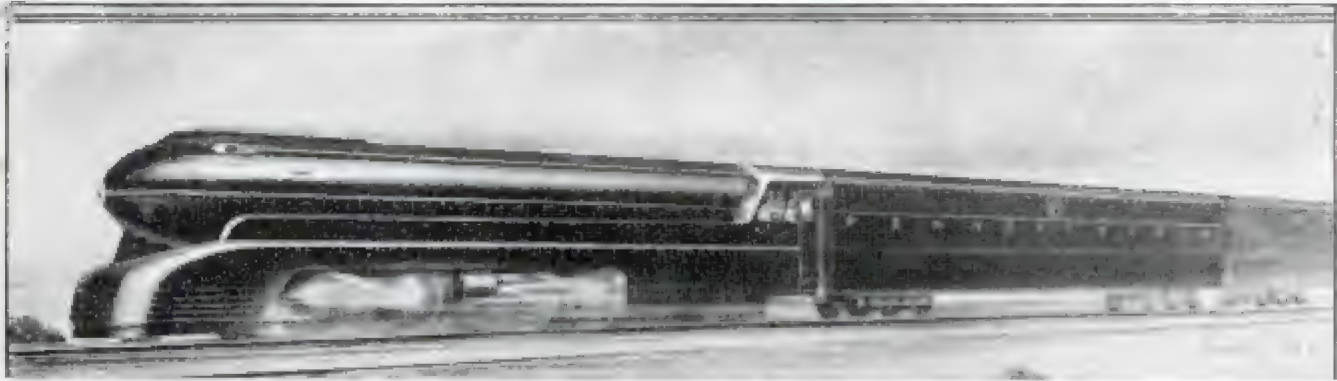
FRANKLIN PARK  
RED FALLS CHURCH  
EAST VIRGINIA







# Giant Steam Locomotive Is Fast as Electrics



Top, the powerful steam locomotive capable of pulling a fourteen-car train weighing 1,200 tons at 100 miles per hour. Bottom, the electric locomotive whose power the steam engine was designed to equal

Designed to equal the performance of its powerful electric locomotives, a giant steam locomotive for use by the Pennsylvania railroad is capable of drawing a fourteen-car train weighing 1,200 tons at a speed of 100 miles per hour. The locomotive, which develops 6,000 horsepower, will be used on unelectrified parts of the railway. It has four rigid cylinders, instead of the usual two, with each pair of cylinders driving two pairs of drive wheels. Bituminous coal will be used in the mechanically fired engine. The tender will carry 25,000 gallons of water and twenty-six tons of coal, sufficient for a 100-mile run. A crew of two will operate the giant "iron horse." The designers worked under a handicap in producing the locomotive because its physical size was limited by railroad clearances such as tunnels, bridges and sharp curves. To equal the performance of the electric locomotive, the steam locomotive has to produce enough power to overcome the disadvantage of its own great weight and that of its loaded tender.

## Model House Built for Child on Lawn of Home

Erected on the front lawn of her grandparents' home in Atlanta, Ga., is a model house recently presented to four-year-old Rosemary Youngblood. The structure is complete in every detail, both inside and outside, the kind of a house in which any little girl would want to set up housekeeping with her dolls.



Here is the neat little model house presented recently to an Atlanta, Ga., child. Note how complete it is in every detail





# MEN *Against*

Courtesy California State Highway Dept.  
Above, auger blower with slice bars for pulling down high drifts is shown cleaning up snow at Donner Summit. Left, snowplow in front of Diesel tractor bucking heavy drifts

the mountains a bundled-up foreman stamps into the steam-heated snow fighters' bunkhouse at the summit and roars: "It's started again, boys! Everybody out!"

That command starts a battle that continues until the storm is over and the last mile of road is cleared. Eighty or ninety inches of snow may fall in the next three

or four days. The thermometer may hover around thirty below and mile-a-minute winds may sweep through the peaks, but the snow fighters keep the highway open. Their job is a tough one and they need the very latest equipment. One huge machine collects the snow from the road and tosses it away in a steady stream. Plows smash the snow aside with tremendous

**F**ORTY feet of snow falls every winter on the transcontinental highway at Donner Summit in California but you can drive through the pass any time. You may be held up an hour or two while a control car leads traffic along a one-way stretch between high walls of snow, but that's the only delay.

When a raging blizzard shuts down on



force. Moving tons of snow a minute with their heavy equipment, the men work in relays twenty-four hours a day until the emergency is over.

It's hard, dangerous work. At night in the driving snow and sleet the men may not be able to see much farther than their radiator caps. A false turn of a steering wheel might send a plow over a cliff. Mountain snow fighters have to know their roads. Snow poles on the outer edges of curves serve as guide posts but these aids may be hidden in a storm. Some ponderous snow machines are too large to steer around sharp turns and the men must back to the last inch before cramping the wheels again. Smash-

ing into uneven banks of snow may skid a truck sideways, or a strong wind may tend to drift a machine off the road. There is always the possibility that a truck may



## *the* MOUNTAIN SNOWS



Courtesy California State Highway Dept.

*Top of page, auger blower scooping up snow and throwing it over the bank. Bottom, scaling down the high walls of snowdrift to prevent dangerous slides*





drive trucks that push V speed plows having blades five feet high and eleven feet across. These great plows can roar along through the snow at ten or fifteen miles per hour until the drifts get too deep. They are powerful enough to buck through snow five or six feet high. Sometimes a plow can patrol many miles of highway in a couple of hours; other times the snow is so deep that the plow makes only 100 feet an hour. Heavier falls of snow are handled by an iron monster known as an auger blower. This machine eats through the snow. Its front resembles

break down and maroon its crew miles from headquarters. In spite of the bitter cold the men sometimes have a hard time keeping cool. Inside the inclosed cab of a truck the heat from the engine and the exertions of the men as they wrestle with the steering and the heavy controls keep them warm. But when they jump outside to adjust the motor or some of the hydraulic controls they run the risk of frostbite or freezing a hand. They wear dark glasses in the daytime to prevent snow blindness.

At the Donner station the first pieces of equipment that thunder out of the truck and tractor roundhouse at the start of a storm are the big five-ton four-wheel-

the cross section of a huge meat grinder and that is just about the way it operates. Two or three horizontal augers, one above the other, bite into the snow and disk it inward toward a hopper where a giant fan with blades half an inch thick picks it up and throws it in a steady stream far to one side. Not even drifts fifteen or twenty feet high can stop this giant. In high snow the operator swings up a boom that he calls a "back-scratcher" and this moves back and forth across the bank high in front of the truck. Revolving claws at the end of the boom tear down the snow and bring it within reach of the augers. The auger blower is carried on the front of a four-



Courtesy California State Highway Dept.

*Top of page, heavy-duty V-plow bucking drifts. It is propelled by four-wheel-drive truck. Bottom, left, auger blower at night. Right, front of auger blower*



wheel-drive truck that mounts a 175-horsepower engine on the rear. The engine moves the truck and operates the snow machine.

Another apparatus is a wide snowplow with a revolving blower or fan at one end. Snow moved over to the blower by the blade is picked up and thrown off the road. On the Donner section of U. S. Highway No. 40, near Lake Tahoe, ten pushplows, three auger blowers, and one railroad-type of rotary plow are used to keep the main highway open and to clear secondary roads. Often the men have to work for days after a storm because high winds keep drifting more snow onto the



Courtesy California State Highway Dept.

cleared roadways. At Berthoud Pass in Colorado, also on the coast-to-coast highway, the snow men fight from sixty to ninety big storms every season. In Wyoming and the other Rocky Mountain states the men battle the elements all through

(Continued to page 120A)



Top, removing snow from U. S. Highway 40. Circle, clearing Chinook Pass, Wash., with shovel. Bottom, snowplow digging out buried section of road as camera grinds



## Helmet for Baseball Batters Is Urged as Safety Measure



*club.*  
An injury to one player aroused demands for better protection of batters' heads. Here is one suggestion, the polo helmet

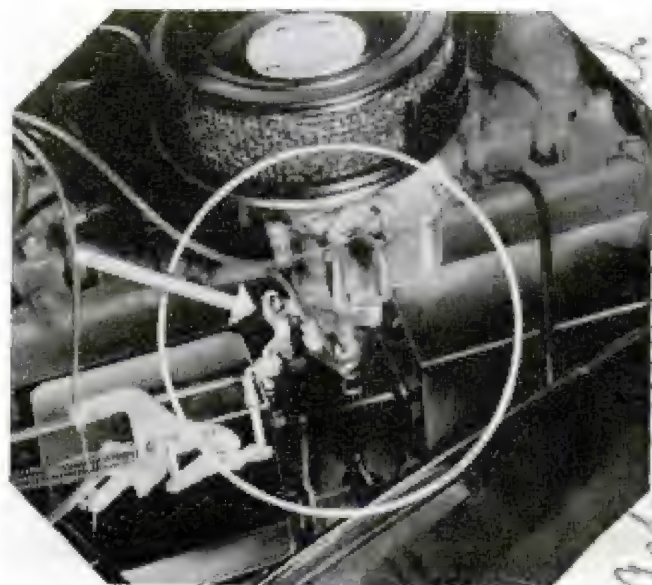
Adoption of some form of the polo helmet for protection of baseball players while they are batting has been urged. A recent accident in which Mickey Cochrane, manager of the Detroit team in the American League, suffered a skull fracture, brought demands for some means of protecting the batter from head injuries inflicted by pitched balls. A batter needs perfect synchronization of eye, brain and muscle to follow the flight of a baseball. An average pitcher can throw a fast ball at the rate of one mile in twenty-five seconds, or about sixty feet in less than half a second. It is sixty and one-half feet from the pitcher's position to home plate, where the batter stands. Thus, in less than one-half second after the pitcher releases the ball, the batter must decide whether to hit or let it go by, whether to dodge the ball by dropping to the ground or backing away—and he must act before the ball thumps into the catcher's mitt. Only an airplane and a specially built racing car can exceed the speed of the baseball. After the ball

leaves the pitcher's hand here is what happens: the ball is reflected on the retina of the batter's eye, the optic nerve conveys the action to the brain, which in turn telegraphs the alarm to the muscles and the muscles act—all in a flick of an eyelash.

## *206 21.* Economy Controls Cut Auto Fleet Costs

Designed as a means of reducing operating costs for owners of large fleets of automobiles, a set of economy controls is available as optional equipment for one make of auto. The set includes special carburetor, intake manifold, hardened steel throttle-stop and manifold heat shields, equipment which makes possible savings sometimes as high as thirty per cent. The economy is attained by making slight sacrifices in acceleration and top speed, with the operating range of the vehicle restricted. For instance the throttle-stop prevents operation above a predetermined speed, enabling the fleet owner to have the vehicle driven at only economical speeds.

With the reduction of speed come reduction in amount of gas and oil required, reduction in tire wear, fewer road failures and usually fewer accidents. Engine wear also is reduced, since the power plant never



Arrow points to controls intended to make more economical the operation of automobiles

*Plymouth Dev,*



McDonald, W. H. 58 4.

## "Drive-In" Bank Built to Balk Escape of Auto Bandits

is operated at capacity. A difference in cost of operation of one-tenth of a cent per mile means a saving of \$30,000 per year for an owner whose fleet travels 30,000,000 miles per year. Even for a small fleet traveling only 1,000,000 miles per year the saving would be \$1,000.

### Coal in Cellophane Is Latest for the Home

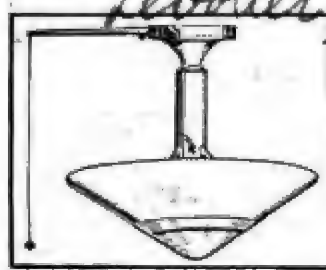
Neatly cut into blocks, coal wrapped in Cellophane is being marketed in a number of cities. This method of packaging enables the householder to attend the furnace without soiling his hands. The coal, piled in orderly rows near the furnace door, may be placed on the fire easily, and the Cellophane prevents smudging of hands or clothes. In some cities the coal is delivered by white-uniformed men who deposit it in the cellar without stirring up the dust common to delivery of loose coal.



Top, a customer drives in to make a deposit at tiny window at left. Bottom, steel gate which rises from roadway to halt escaping bandits

### Extension Arm for Light Cord Protects It from Wear

Lamp cords that rub against reflectors, shades and bowl fixtures are subjected to needless wear. They can be protected from rubbing by installing an extension arm on the switch. The cord is inserted through the hole in the end of this arm and thus clears the fixture, hanging free. The arm is made in several finishes to match the fixture.



Steel wickets, bulletproof glass, tear-gas ports and driveway barriers are built-in features of a California bank into which customers may drive and transact business without leaving their automobiles. Checks and money are passed in and out through a revolving metal drum. Grille gates operated by electricity may be raised from the floor of entrance or exit to block the escape of hold-up men. Special tear-gas ports on each side of the steel wickets permit the teller to discharge gas to the outside by pressing a button. The customer enters through a driveway, stopping in front of the teller's wicket. A series of offset panels permitting sound to filter through, convey the voice in either direction.

White Cone

see Dec 1936-865

5638

Mr. Hull 1/2 C. 2/2

Security First National Bank - Version 2 898 Santa Fe Ave.





# WIRE

Top, demonstrating apparatus for transmitting pictures, letters and fingerprints by radio. Circle, putting picture on transmitter for sending by telephone



and limb to shoot important pictures. Aiding them are the scientist and the research man who have so improved the camera and its accessories in recent years that photos may be taken under conditions deemed impossible not so long ago.

But taking the picture is only half the job. The other half is to get it back to the newspaper with the utmost speed. For years all available means of transportation, from carrier pigeons to air-

planes, were used. Then science developed a means of speeding finished-photographs over wires almost as rapidly as a reporter could give an eye-witness description.

"Several months ago," says Harry Baker, editor of International News Photos, "the frantic order to 'Get that picture, get it fast and forget the expense!' has been replaced by 'Wire that picture—at regular rates.' For many years, almost since the very first news picture appeared in a daily paper, the photograph of the event trailed the news story by hours, sometimes by

By Emile C. Schnurmacher

WHEN a giant passenger plane crashes, or a big liner catches fire at sea, or any other important news event occurs, America's newspaper editors shout "Pictures!" Then, like rival generals, they lay their plans to get the best pictures and to bring them back as swiftly as possible so their own readers may be the first to see the photographs, and read the news, of the event. In the front lines of this battle are the news photographers who risk life





*that* PICTURE!



*Top, picture after transmission by telephone. Bottom, original picture. Right, battery of news photographers on the job. After the pictures are taken they race to get them to the home office*

days. Speed became the obsession of the photographer who resorted to many ingenious means of hurrying the picture back to the office. Today the photographer does not hurry his plates back to the office. Instead, he develops his plates on the spot in a miniature darkroom, puts them on the wire and goes on to another assignment."

During the early days of experimenting with picture transmission, engineers succeeded in sending photos in the form of dots by electrical impulses so they were received with a "screen." They arrived in blurry form, somewhat similar to the pictures transmitted by radio over long distances today. Adaptation of the photo-





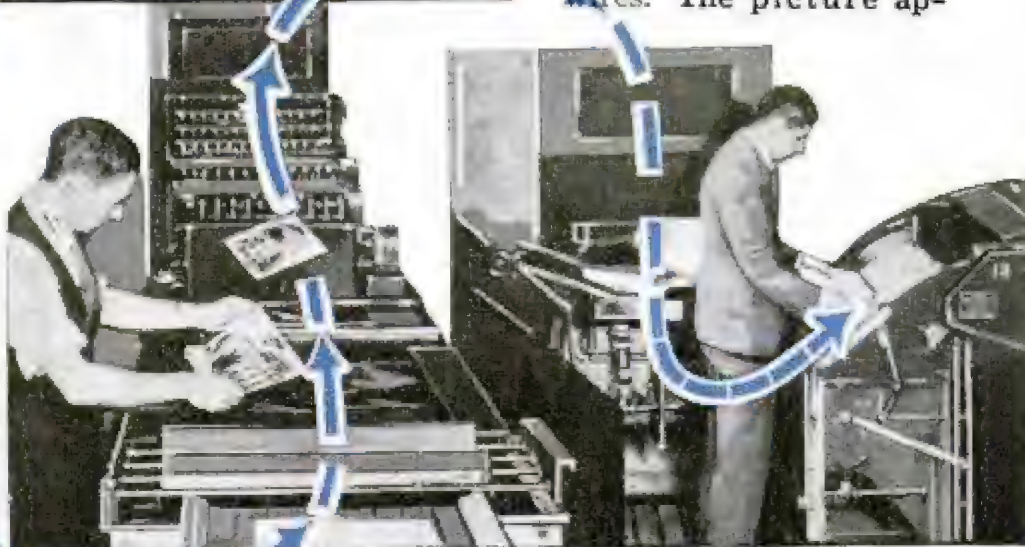
*Top, center and right (following the arrow), steps taken in news-picture office. One negative received by telephone may be used in producing 7,000 prints in one day. Bottom, wired photo recording machine*

electric cell to picture transmission a little later made it successful, the arriving picture being reproduced almost as perfectly as the original.

Engineers developed a method whereby the ordinary glossy print of a photograph was attached to a metal drum with adhesive tape and revolved by a six-volt motor. Rays from an exciter lamp were passed through a condensing lens and focused on the print. This light was reflected back through an objective lens, an aperture plate and onto a photoelectric cell where it was combined with an 1,800-cycle signal. It then was put through an amplifier and the 1,800-cycle signal was applied to a telephone line.

The Associated Press transmits its "Wirephotos" over leased wire circuits extending to every part of the country. The first circuit was limited to New York, Chicago and San Francisco.

In February, 1935, a Times-World photo transmitting machine, still in an experimental



stage, arrived in San Francisco the day that the U. S. navy's dirigible "Macon" crashed into the Pacific ocean. A photographer dashed into the picture company's offices with a photo of the survivors and it was put on the experimental machine and sent to New York over regular telephone wires. The picture ap-

peared in the New York Times the next morning.

That was the real beginning of the modern battle for speedy transmission of pictures. A few months later Times-Wide World and International News Photos had perfected portable picture transmitters which could send photographs over ordinary telephone lines from anywhere. The "sound photo" apparatus developed by Walter Howey, advisory editor of International News Photos, was put into use on April 3, 1936, when a photograph depicting announcement of the postponement of the execution of Bruno Richard Hauptmann was put on the telephone wires from New York to San Francisco. The cost of sending it was only thirteen dollars for the eight-by-ten inch photograph. The picture was placed on the wire by means of the sound-photo sending machine whose

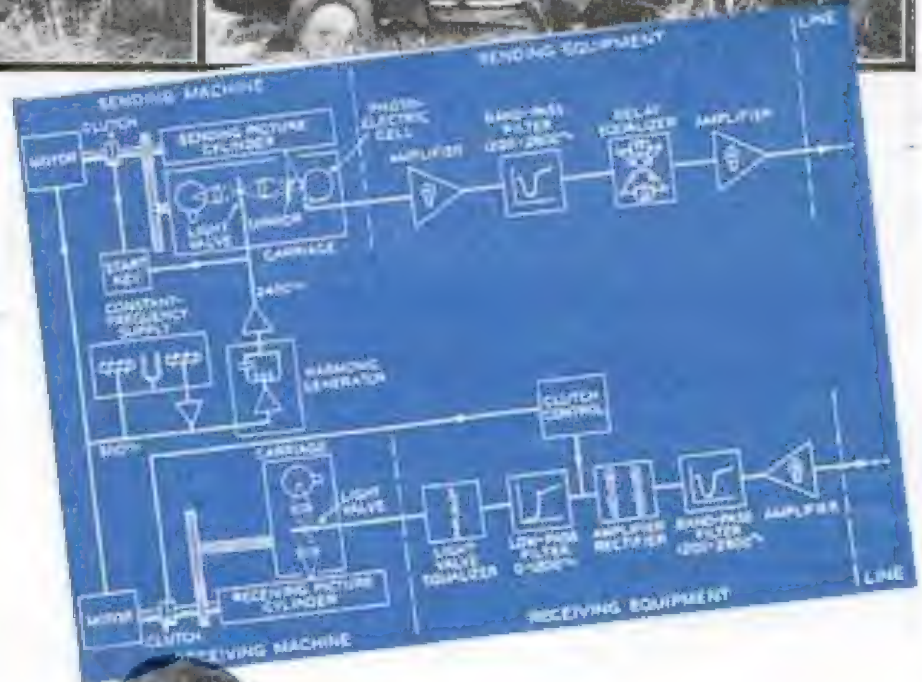




drum revolved at ninety revolutions per minute in exact synchronization with the revolving drum of the receiving machine in San Francisco. As it was received and changed from sound waves into a picture, it really became a "musical composition" according to Mr. Howey. There was a shrill note which, when changed into picture form, became the white spots, a range of lower notes which became various shades of gray and a still deeper note which became the black part of the picture.

"Since that picture was transmitted a little over a year ago, the qualities of the telephoned photographs have steadily improved," stated Mr. Baker. "And at the same time, a nation which has become picture crazy saw picture stories begin to appear much more rapidly in the local newspapers than ever before. As

an example, I might cite the pictures of the wrecked airplane which crashed last April in the mountains southeast of McNary, Ariz., in a nearly inaccessible spot. When we received the flash that the air liner had been discovered with its eight victims, I



Top, left, two photos after wire transmission. Right, originals of same pictures. Center, diagrammatic explanation of Associated Press sending and receiving systems. Bottom, sending picture by telephone. Note receiver on table. It has no physical connection to transmitter

got in touch with Kansas City where one of our photographers and sound-photo engineers were covering a strike.

"Packing their camera and portable sound-photo equipment, they caught the

(Continued to page 128A)



## Dual Controls in Auto Help Instructor Prevent Accidents



*Note the second set of controls at right of car. This enables instructor to prevent accidents while teaching students to drive*

Under a program launched by the American Automobile Association to make instruction in driving a part of the curriculum, students in several American high schools are learning the theory of road rules and are being given lessons in driving. Actual automobiles are used to make the road instruction practical. The cars are painted white with special AAA lettering. Each has a set of dual control clutch and brake pedals installed in the right-hand front seat position for the use of the instructor. The dual controls are connected directly with the student's regulation pedals. With dual control pedals accidents are prevented while the student is driving as the instructor may throw out the clutch and apply the brakes in an emergency. In addition, correct clutching, braking and shifting of gears may be taught more easily. The students do their driving on practice streets marked off with pedestrian crosswalks, stop signs, blinkers, traffic lights, parallel and angle parking and right and left turns. Thus actual driving conditions may be experienced by the student. Twenty-eight hours of instruction are given, twenty hours in the classroom and eight hours on the road, for which the student receives a three-hour credit. So much interest has been created

by this phase of highway safety education that colleges and universities are training high-school teachers at summer sessions to teach the course.

## Ship Radio Alarm "Listens" for "SOS" Calls

Relieving the radio operator from duty, an automatic radio alarm for ships "listens" for "SOS" calls. Upon receiving such a call it rings bells and turns on warning lights in the radio operator's sleeping quarters and on the bridge of the vessel. The apparatus is arranged to receive on the 600-meter wave

length on which distress calls are dispatched and on a small band on either side of it so that the receiver will not miss a call from a ship whose transmitter may be slightly off the proper wave length. It is



*Adjusting radio "listening" apparatus to catch distress calls while operator is off duty*

set to "recognize" a series of dashes, each of four seconds duration, separated by an interval of one second. The equipment has an electrical "memory" that retains four

*Radiomarine Corp.*



such dashes in sequence, after which it sounds the alarm. The device may be used on cargo vessels of 5,500 or more gross tons which employ only one radio operator. It is not accepted as a substitute for radio operators on passenger ships.

### Bird Photographed Stealing Cream from Bottle

When a fat bluejay tripped a hidden camera shutter control and took his own picture recently, he solved the mystery of who was stealing the cream from milk bottles in a western city. An amateur photographer rigged up the trap, drilling the bottom of a bottle and attaching to the under side of the cap a connection which led to the camera shutter. Next morning the cap was off the bottle and the shutter had been sprung. Upon developing the film the photographer found a picture of the bluejay removing the cap.



Here is the thief, caught in the act by camera trap worked out by amateur photographer

## Dance Floor Made of Glass Is Illuminated from Below



Dancers going through their routine on glass floor. Note the striking effect produced by electric lights installed beneath the floor

Designed by the artist, Dean Cornwall, a dance floor made of glass has been installed in the Raleigh room of a New York hotel. Lighted from below by controlled banks of electric lamps, the heavy plate-glass floor has a slightly pebbly finish to prevent slipping.

### Fish Lure Emits "Cold Light" from Mercury-Neon Tube

Neon gas and mercury mingling in a tiny tube generate the "cold light" of a luminous fish lure just invented. Batteries and current are unnecessary. In the fish-shaped celluloid lure with hooks at each end, the inventor placed a tube containing the mercury and neon gas of special mixture. A hairspring connects this tube with the tail to permit agitation without breaking it against the sides of the lure. When agitated, this mixture develops a red glow which attracts fish. The lure is especially adapted to deep-water fishing.



Chas. Michael J. Murray H.C. 7



## Sliding Roof on Automobile Admits Sunlight to Interior



Looking down through the top of car after sliding roof was moved back to permit entrance of sunlight.

Getting a sun tan while you ride is possible if your automobile is equipped with a sliding roof like that a photographer discovered recently on the streets of an American city. The roof slides in a tight seam which prevents rain from entering when it is closed.

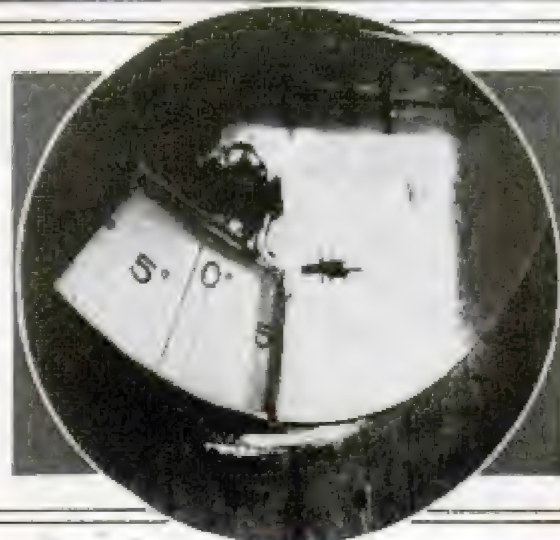
## Roots Grown Fast on Cuttings by Chemical Treatment

Formation of roots on cuttings is speeded up by a substance now on the market, making it possible for the amateur to achieve results which commercial growers will find difficult to obtain without the chemical, even under ideal greenhouse conditions. Indolebutyric acid is the base of the substance. Application is quite simple, the cutting being placed in a solution of the chemical for about twenty-four hours before it is planted in the usual way. The Japanese yew, one of the most difficult trees to root from cuttings, produces roots in six to eight weeks after treatment, compared to nine to twelve months without the chemical. The American holly,

another difficult tree to raise from cuttings, sprouts roots in about six weeks after soaking in the solution. Among the trees and plants known to be responsive to treatment with the chemical, Auxilin, are: hawthorne, blueberry, boxwood, azalea, bittersweet, coleus, dahlia, dogwood, geranium, carnation, elm, gardenia, lilac, rose, spruce, spirea, chrysanthemum, poplar, honeysuckle and many others. The makers point out that Auxilin stimulates only the formation and growth of the roots and that it is not a plant food and will not restore life and vitality to dead plant tissue.

## One-Wheel Arched Beam Measures Road Curve

Highway curves can be measured accurately by a one-wheel arched beam attached to a light truck. The device is twenty-five feet long. At the front it is mounted on a pivot on the truck and at the other end it rides the road on a rubber-tired wheel. Its arched structure provides



Top, curve measuring machine. Bottom, indicator showing degree of road curve



## Diesel Ship Rides to Lake on a Diesel-Drawn Trailer

clearance for obstacles in the road. The front mounting fits into a set of gears that operate an indicator calibrated to fifteen minutes. The swing of the truss causes the gears to turn the indicator at a ratio of nine to one, enabling the engineers to determine the exact degree of curvature on turns. Figures on the three-foot register are easily discernible from the front seat of the truck. A red flag and red lights protect the odd structure from traffic. When not in use the device may be unfastened and carried on the truck.



Big Diesel-powered boat passing through Swiss village on its way to launching in mountain lake. It is riding on trailer towed by Diesel truck

## Fishing Rods Held on Top of Auto by Clamps

Fishing rods can be carried on top of your car by attaching special clamps, which cling to the car top by means of strong suction cups. The clamps are lined with sponge rubber to protect the rods. Universal joints permit the carriers to hold the rods straight, regardless of the automobile contour. Similar, but deeper clamps to carry several sets of skis on top of the auto can also be obtained.



Clamping fishing rod to top of car. Suction cups hold clamp and sponge-rubber lining protects rod

Over mountain highways and village streets in Switzerland a big motorship traveled recently, on its way to a lake near Langenargen. Although it was going to work for the Swiss Steamship company, it was no steamer but a Diesel ship, and was hauled on a specially constructed trailer drawn by a Diesel truck.

## Hinged Bumper for Bicycle Absorbs Collision Shock

Bicycle bumpers, hinged and flexed to take up the shock of collision, are now on the market. They can be attached in a few minutes and are made to fit any bicycle.

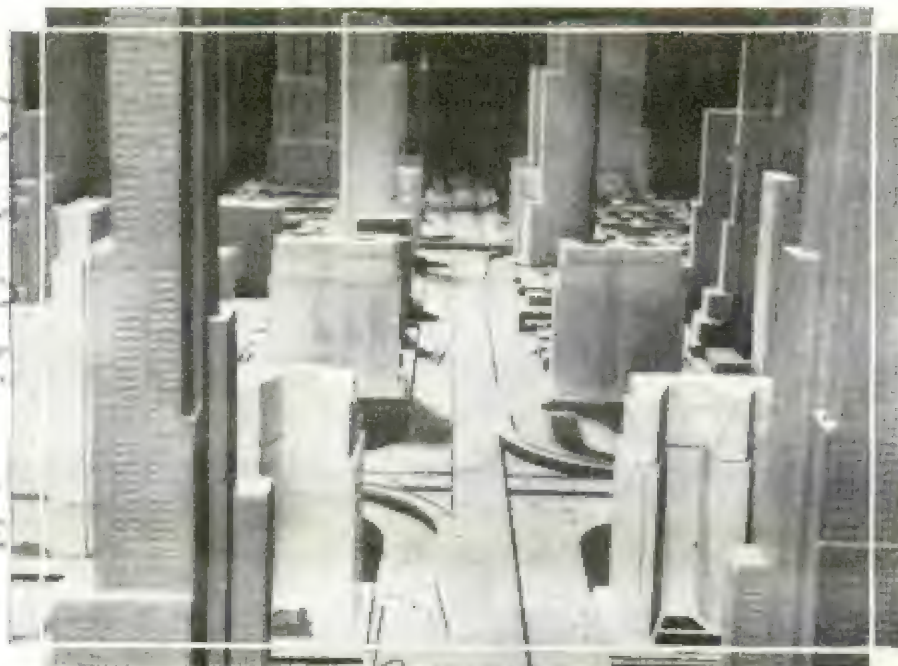


magna Products Co



5/26/37

## Model of Express Boulevards Shows Future Traffic Plan



Here is model of future city's street system. Note arrangement of high-speed boulevards, with cross-traffic on street below

Traffic of the future is expected to be carried on express boulevards like those designed in model form by Norman Bel Geddes and shown to the American City Planners Association recently. The express boulevard system was recommended by Dr. Miller McClintock, head of Harvard's bureau for traffic research, who says that stop-and-go conditions of today are caused by a useless street system. Dr. McClintock urged that American cities rebuild their streets to facilitate swift travel by motor vehicles and to carry the increased traffic burden of the future.

Cambridge, Mass

### Oxygen Face Tent for Pilots Urged as Safety Measure

To make flying safer for the public, Dr. Alvan L. Barach of Columbia University College of Physicians and Surgeons recommends that airplane pilots wear oxygen face tents at high altitudes. Lack of oxygen is regarded by Dr. Barach as a frequent factor in airplane accidents and he urges commercial transport companies to adopt compulsory oxygen inhalation for pilots navigating at 10,000 feet or over. Lack of oxygen causes mental impairment and certain bodily changes at altitudes

at which transcontinental flying now takes place. These changes include poorer vision, hand tremors, fatigue and reduced control of other nervous and muscular processes. The oxygen face tent, originally developed for the treatment of anoxemia, is simple and light. It fits over the nose and is attached to the head by ear pieces or an elastic band. Oxygen is admitted through a perforated rubber tube.

### Typist's Copyholder Is Made of Cardboard

Constructed of cardboard, an inexpensive copyholder for typists folds flat when not in use. It never requires oiling or repairing. The device can be adjusted for either single or double spacing by moving a lever and the space bar can be regulated to suit the individual touch.



This handy cardboard device holds the line for typist. It is easy to operate

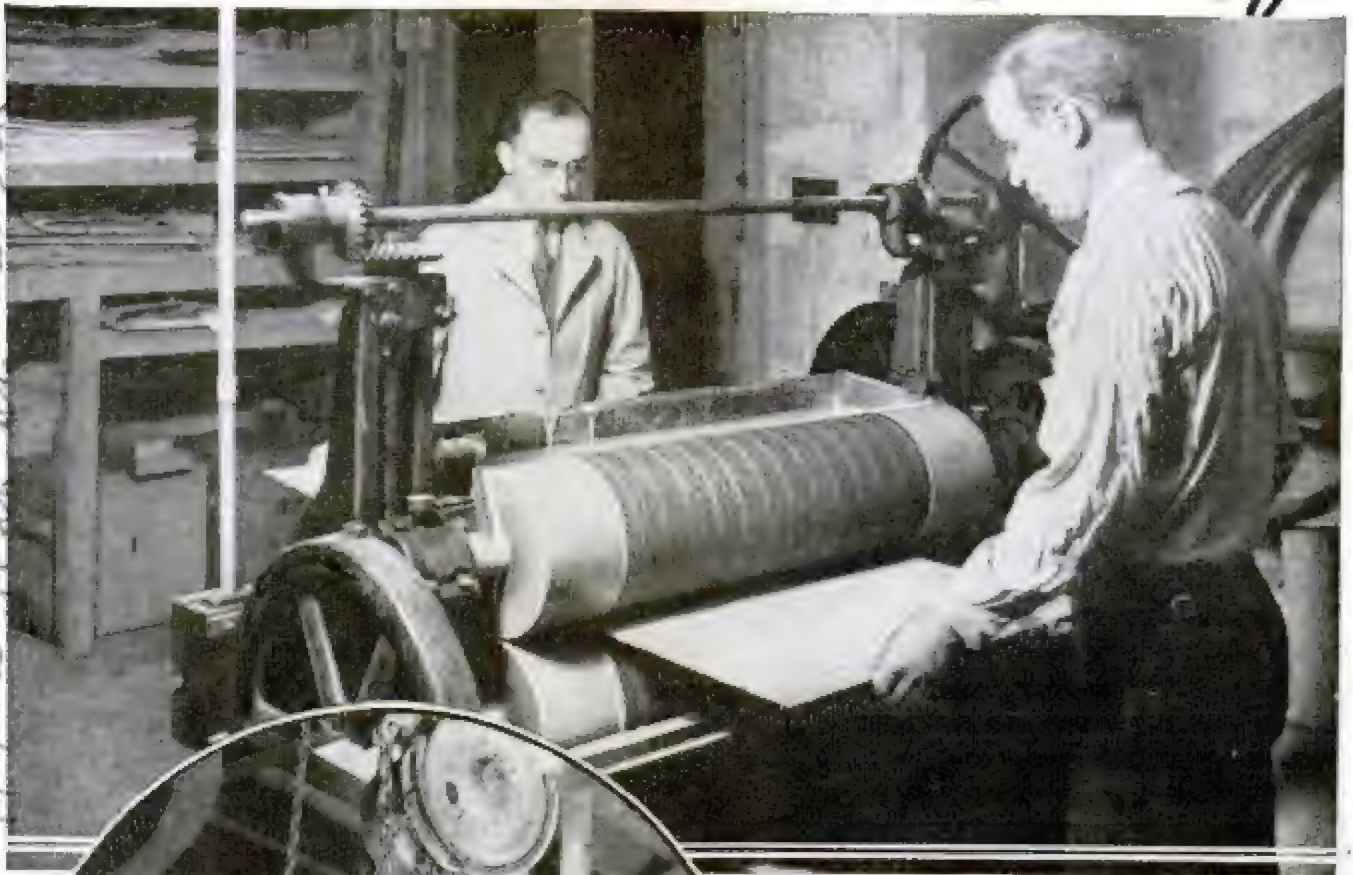
Magie Liner Co.







# A NEW AGE *of*



By Charles Morrow Wilson

**C**ARPENTERS of tomorrow may work with gluepot and brushes instead of hammer and nails. We may even find ourselves living in houses built largely of paper, or woodpulp products and glue. When such houses materialize they most probably will be stronger, cheaper and more resistant to fire, storm and weather than most homes of today.

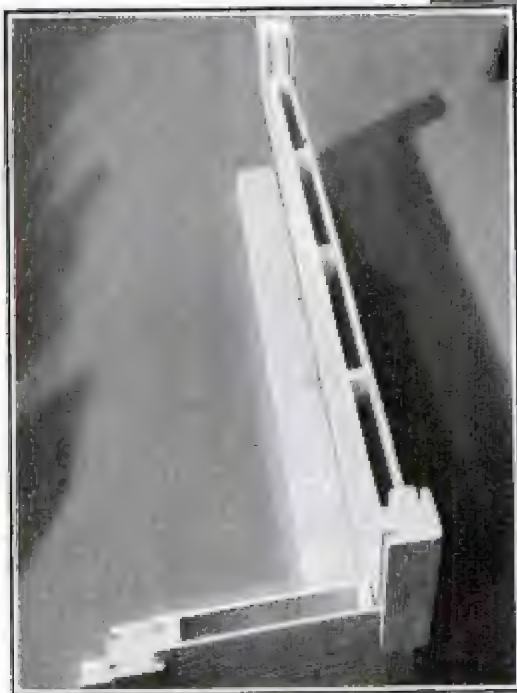
The new age of glue is a structural age. Consumption of structural glues has almost tripled during the past five years.

Today science is brushing away the mystery which has surrounded the actual properties and chemistry of adhesives for centuries and is perfecting glues which are weatherproof, heatproof and actually stronger than any solid building materials; glues with coefficients of expansion practically identical to those of common building materials.

Top, glue spreader aids in making glued woods. Bottom, raising log from steam bath before grinding it in veneer mill



# GLUE



The practical science of glue got its start from veneering. The next big step in its advancement came with aviation. Airplane construction requires maximum strength and cleavage with minimum weight. During the world war American scientists perfected a casein or milk-curd glue for airplane construction, a product capable of developing the strongest joint then known. Since the war other uses for glue in the modern plane have been found.

Meanwhile further perfection of glues has introduced laminated wood construction, big strong arches, braces and dimension timbers made by gluing together small strips of wood, or wood scraps, pressing or molding into any desired size or shape. Such supports make possible the building of a modern conmer-



*Left, modern wall structure has grooves for glue to increase strength and weather resistance. Right, technicians mold arch and support timbers from small scraps of wood with glue applied under pressure*

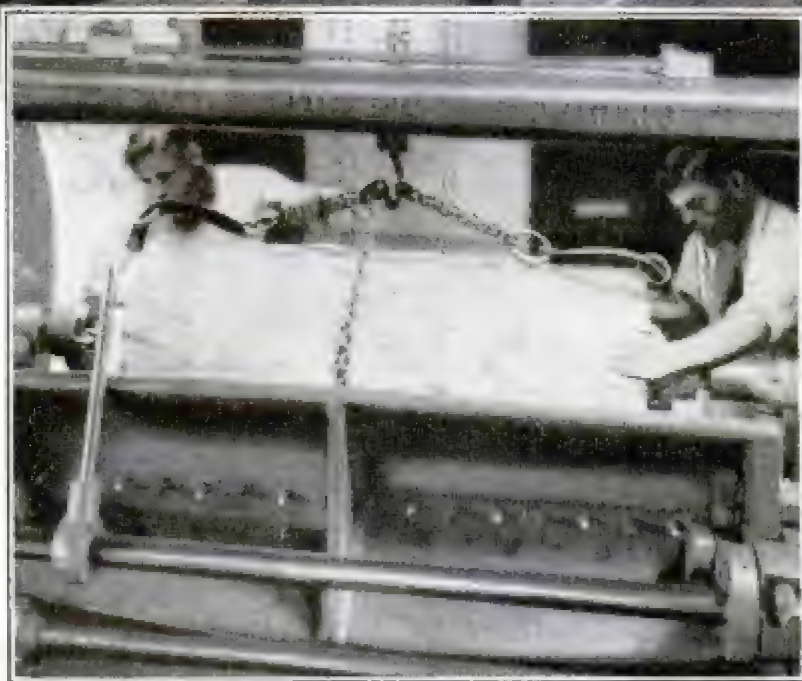




cial structure entirely of wood. A 364-foot radio tower at Richmond, Va., and a 160-foot single-span bridge over the Caddo river in California are of this construction.

This type of construction has introduced from three to ten pounds of glue into every automobile, solved problems in the radio industry and almost doubled the use of glues in paper and woodpulp products. Perhaps the greatest of all structural uses for glues is developing in the prefabricated or factory-built houses, where various industrial builders are beginning to make use of assembly line efficiency and glue structure for increased strength and better use of wood scraps and short-length timber.

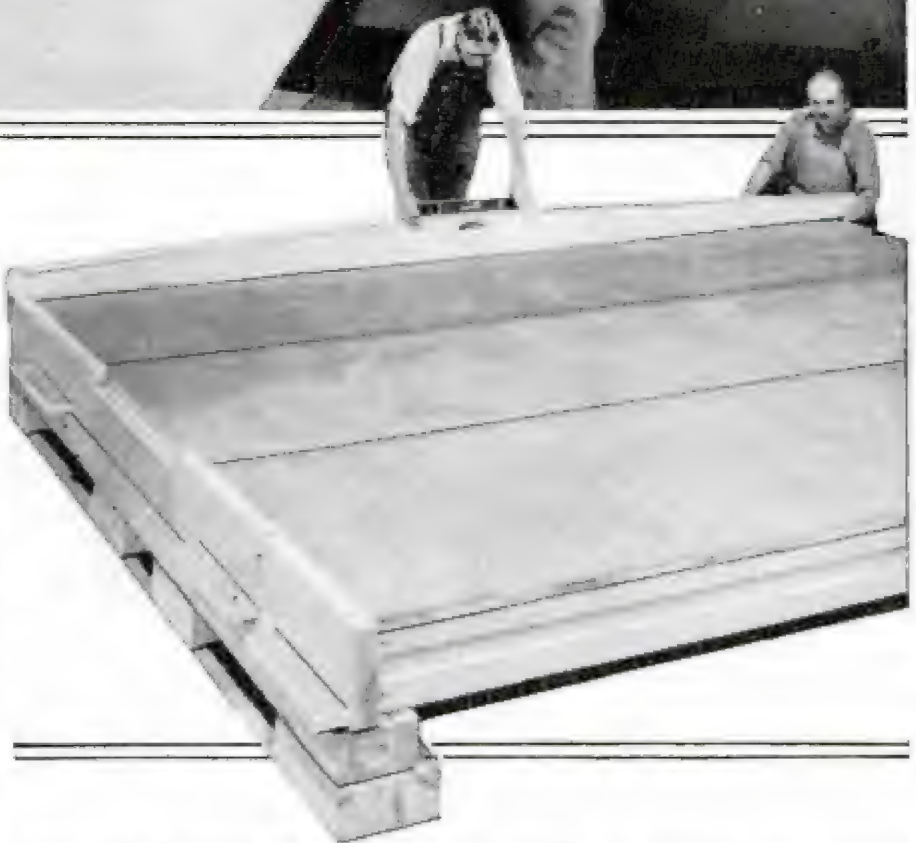
Progress in the science of adhesives closely associates glue materials with standard food crops, which means that in addition to structural importance the new age of glue is becoming very important to farming, dairying and meat-packing. It means a profitable use for millions of pounds of crop materials otherwise wasted. Primarily there are three types of glue materials: meat glues, including blood, bone, marrow, and fish wastes; casein or milk glues, and vegetable glues which in-



*Top, assembling units of modern house with casein glue. Bottom, setting log into veneer cutter. Veneering depends wholly upon good gluing*

clude both starches and proteins. Strongly established are meat glues which have been a by-product of the packing industries for some years. Casein glues are fast becoming one of the major uses for milk. Vegetable protein glues originated on the Pacific coast for use in the plywood industries of that section. Plywood made by gluing together thin strips or layers of wood with alternate grain direction solves the problem of log waste. It is a valuable building material which is lighter and stronger than many kinds of lumber. An effective plywood glue has been developed from soybean meal and peanut meal. These





*Top, step in manufacture of plywood, which is dependent upon strong glues for strength. Bottom, laying short-length board floor with glue base*

vegetables, cheap and plentiful, supply about half the vegetable-base glues now used in American industry.

Heretofore the principal source of vegetable glue has been cassava starch made from the roots of a tropical plant by the same name. In food form cassava root is called tapioca. Since this crop cannot be raised in the United States, various manufacturers and the U. S. Forest Products Laboratory are working with some success to produce good wood glues from other common vegetable starches such as potatoes, corn, rice, and wheat. At present white-potato starch seems to be the most promising source. Potato glue for wood construction is already on the market.

This promises another important use for cull potatoes, which is timely in view of the fact that the former potato-starch industry is practically dead. Advantages of

vegetable glues include cheapness of material, usability while cold, resistance to souring and decay. Heretofore they have had the disadvantage of lack of water resistance, tendency to stain and set slowly. Science and industry are now overcoming these disadvantages.

Almost any type of vegetable or grain

(Continued to page 123A)



# Traffic Cops Time Speeder by Short-Wave Set



Officer above, at left, checks stopwatch as he receives signal over short-wave radio telling him speeding auto is entering measured section of street. Below, police await order to pursue speeder. Above, right, officer making an arrest

"Stand by for green coupe," calls a traffic policeman into the microphone of his short-wave set, in a squad car posted beside a heavily traveled boulevard. "Ready? Clock!" he says as the speeding car passes him. Hidden behind shrubbery 770 feet down the avenue another officer, with receiving set, presses his stopwatch at the command "Clock!" When the green coupe draws abreast of him he checks the watch. Eleven seconds. His chart shows him that a car traveling 770 feet in eleven seconds was going forty-eight miles an hour. He knows in an instant whether the driver was exceeding the lawful limit. This method, adopted in a Missouri city, furnishes the police with definite evidence against

speeders and makes it unnecessary for the motorcycle officer to risk accident in watching his speedometer while trailing a car. The short-wave traffic squads are provided with charts showing miles per hour for various elapsed times over the 770-foot stretch.

## Problem of "Singing" Propeller Challenges Shipbuilders

Frequent appearance of ship propellers which "sing" is a problem challenging engineers and shipbuilders. The "song" has a brazen timbre and is generally of a definite pitch, causing discomfort to passen-

Technology Review  
P 327



gers and interfering with navigation. So loud is the noise at times that classification authorities have refused to grant seaworthy certificates and owners have declined to accept delivery. Conditions causing the phenomenon are apparently quite critical because two propellers on the same ship rarely emit the same volume of noise, while identical propellers on a sister ship may operate satisfactorily. A British naval engineer suggests that the existing forces are probably eddies and that certain characteristics of the propeller's metal determine in considerable measure the responsiveness of the propeller to the eddies. Accuracy of finish also seems to be a controlling factor. Only by substituting a cast-iron propeller can a cure be guaranteed. When cast iron is used, however, rapid pitting of the blades indicates that the singing may be another manifestation of the forces causing erosion and cavitation.

### Simple Profile Copier Aids Architects

Copying profiles or moldings is made easy by a simple instrument which will save time and labor for architects, builders, carpenters, draftsmen and sheet-metal workers. Every line, contour and sweep will be reproduced and copied on paper by the tracing pen as the user moves the instrument along the door casing, window sash, panel molding or other profile. The recording paper comes in rolls. After taking off samples the craftsman sends the paper on which the profile has been copied to the mill workers to be reproduced in exact detail. The instrument copies up to the ceiling



line and down to the floor. It is made of cast aluminum, making it light but sturdy, with steel runways and ball bearings.

## Fishing from Power Glider Is the Latest for Sportsmen



Top, ready for fishing. Center, pilot hooks one. Bottom, back to shore with fish. Note rent in wing where pilot fell.

Something new for sportsmen was offered recently on the Pacific coast when a glider pilot went fishing in his power amphibian craft. All went well until the pilot, Don Stevens, hooked a barracuda. In his excitement he slipped and fell through one of the glider's wings, disabling the craft. Stevens was rescued when his glider drifted to the beach and was pulled ashore. Through all the excitement he managed to hang onto the fish.

E. W. Larson 89 Spring



# Skeet Field Is Floodlighted for Night Shooting

cmd. Paul W. Hartney Santa Monica  
544-



Top, skeet shooters on field for night sport.  
Bottom, left, field lamp directing light upward.  
Right, floodlight on top of clubhouse

Illumination of the skeet field is making night shooting possible for sportsmen unable to leave their business during the day. At the Los Angeles-Santa Monica Skeet club two 2,000-watt flood lamps illuminate the entire field. These are installed at a height of about twelve feet, well back of station No. 4. Careful adjustment directs the beams on each station so that the shooter may catch his rib and sight in-

stantly. Separation of the lamps by about fifty feet prevents the glare from blinding the skeet shooters at stations No. 1 and No. 7. Between the trap houses, about five feet to the inside, is a line of six 500-watt lamps with reflectors to direct light upward and outward on the line taken by the flying targets. The targets are white-washed, and many shooters say they appear more conspicuous against the night



sky than those used in daylight. These field lamps are located on the ground and are covered with wire mesh to protect the bulbs from bits of broken targets. Three lamps are arranged, about fifteen feet apart, between stations No. 1 and No. 8, and three between stations No. 8 and No. 7. Each end light is turned in slightly to prevent glare. Night shooters find that after a little practice they become accustomed to the artificial light and their scores are about as high as those made in daylight.

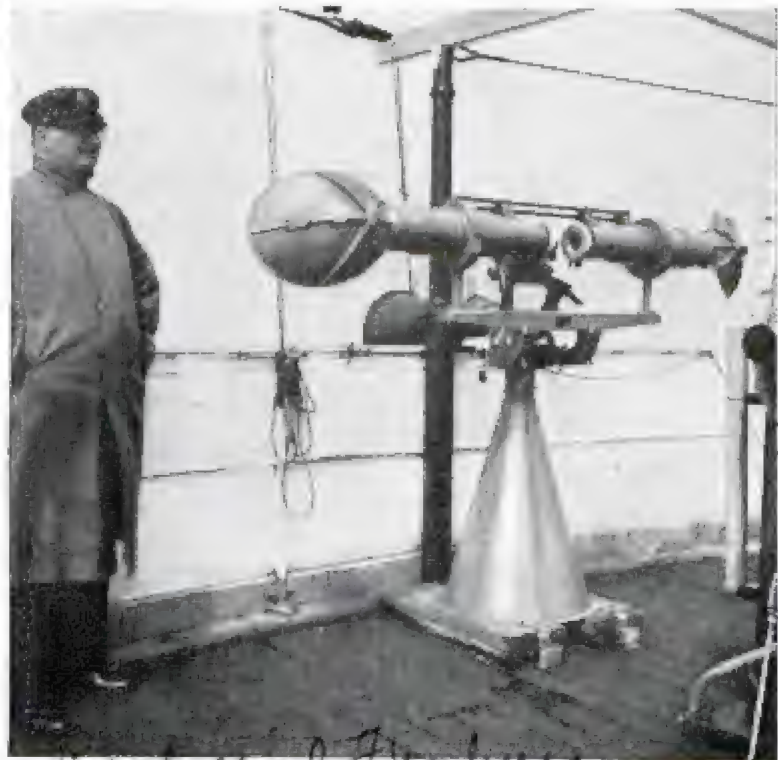
### Parachute Drops Pigeons to Aid Trapped Soldiers

Carrier pigeons trained to bring messages home to headquarters are used by the Austrian army to carry communications from the firing lines. The pigeons are locked in a wicker cage with a parachute attached, and when soldiers in the front lines are cut off from the rear, army aviators drop the cage to the troops who use the pigeons to keep in touch with headquarters.



Pigeons in cage are trained to carry messages from front when dropped by parachute to firing line

### Sound Direction Finder for Ships Detects Obstacles in Fog



Here is the sound direction finder mounted on ship for demonstration purposes. It has a range of fifteen miles

For detection of the presence of other ships or obstacles ahead in foggy weather, a direction finder for ships has been given extensive tests. The instrument incorporates a sonic hearing device which is used to take bearings on ships, light vessels, lighthouses, bell buoys and whistling buoys within a range of fifteen miles. It also can detect and fix the position of icebergs by means of the echo effect. The instrument is claimed to be protection for ships against collision in fog, snow flurries and during periods of poor visibility.

### Non-Fog Goggles for Swimmer Aid Vision under Water

Fog-proof goggles have been developed to permit the swimmer to study submarine plant life and fish with comfort and good visibility. The heavy glass lenses mounted in a rubber frame are held tight to the head with an elastic band. Inside the goggles is a small groove in which a few drops of water are placed. During a swim, this water is agitated across the lenses and clears fog as fast as it forms.

C. P. Sawyer & Co. Inc. 317 E 34th St. New York

South Bend, Ind.

Pictorial Feature 49

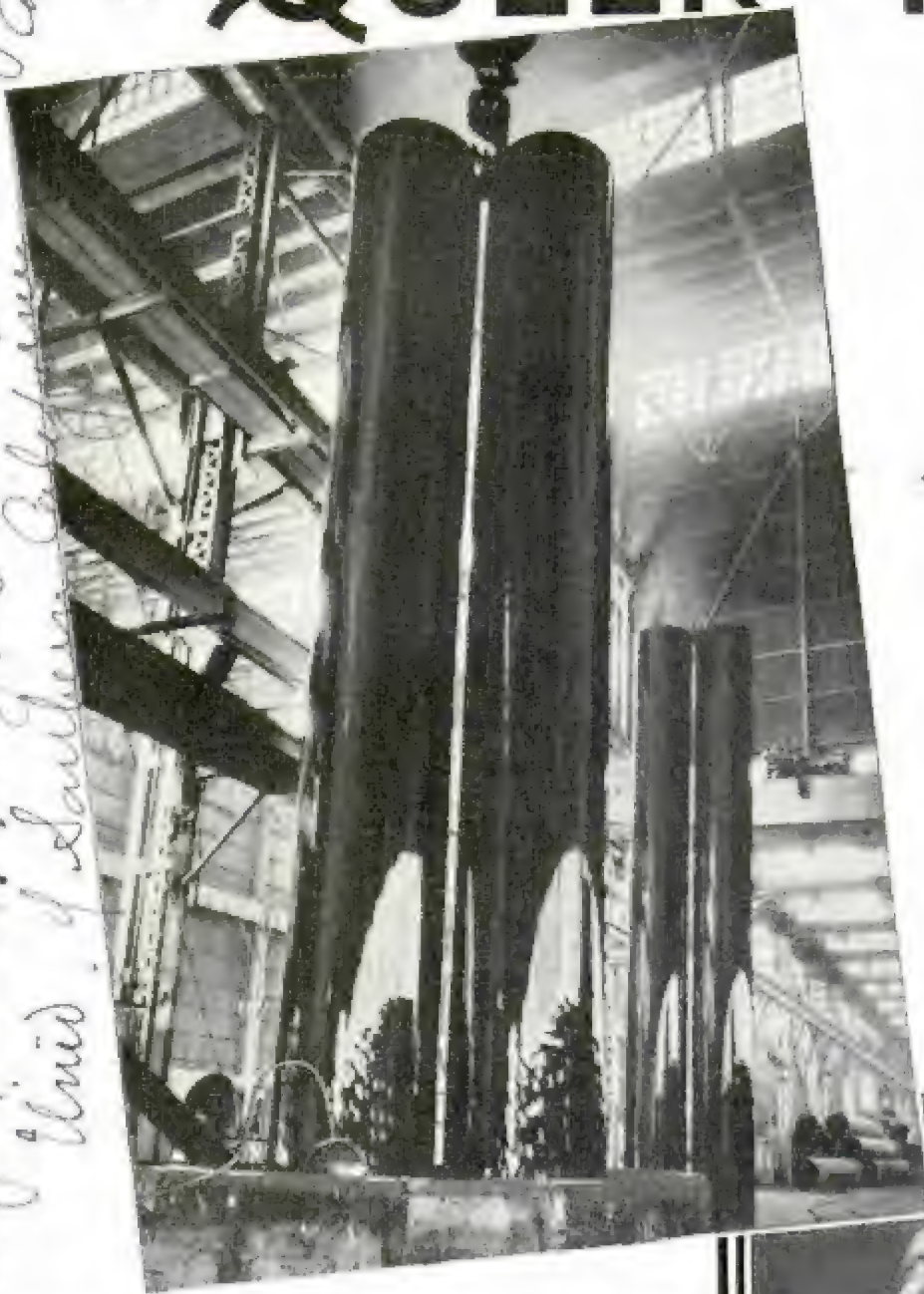
A. S. Cover



# QUEER FACTS

of it can be transformed into gasoline of sixty-six-octane rating. Paving streets with seals is another possibility since seal oil also provides very good asphalt.

You can manufacture gasoline from cottonseed oil, getting fifty-four gallons from every 100 gallons of oil after breaking it up and reforming it with heat and pressure. Coconuts are another source, as are olive oil and palm oil. Banana oil makes quite a good gasoline, but usually this transformation is reversed. Fuel gases are converted into synthetic banana oil which is used in fingernail polishes and other products. The manufactured oil is of good quality and is cheaper.



**N**O ONE is likely to go fishing for gasoline but the idea is not as ridiculous as it seems. Sardines and other kinds of fish yield good grades of motor fuel.

Growing gasoline on the farm also sounds silly but it can be done. Few people will ever try it because petroleum is a cheaper and more convenient source. In their exploration of gasoline molecules chemists have found that many animal and vegetable oils yield excellent motor fuel. Fish oil can be converted into about forty per cent gasoline and in countries such as Japan, where fish oil is almost a waste product, it might pay to turn it into fuel on a commercial scale. Seal oil is better than fish oil because sixty-six per cent



**Enameling steel pipe in petroleum to prevent corrosion. Bottom, wax frozen out of oil by evaporating propane at forty degrees below zero**



# *about* GASOLINE



Courtesy Union Oil Co.

"The reason why gasoline can be manufactured from fish or cottonseed oil is that gasoline consists mainly of complex arrangements of hydrogen and carbon atoms," explains Dr. L. J. Stabler of the University of Southern California. "Nearly all oils and tars, no matter from what sources, are composed of hydrocarbon groups that can be broken down and rearranged into the molecular structure of gasoline. Theoretically it is even possible to take a handful of carbon and a bottle of hydrogen gas and unite them in the laboratory to produce gasoline."

This sort of chemical juggling is only one of many new wonders in the petroleum industry. New factories are springing up all the time as new uses for petroleum are



Top, plant where propane gas is solidified and used for freezing wax out of oil. Bottom, chemist converting liquid from waste gases into resin used in paint





*Above, driver testing power of new high-octane gasoline. Right, top of cracking tower in which evaporated petroleum molecules are broken apart into gasoline molecules*

discovered. A few years ago gasoline, lubricating oil and a few allied products were about the only things manufactured. Today petroleum derivatives are numbered by the hundreds and range from fly spray to T.N.T. and from lip sticks to golf-ball cores.

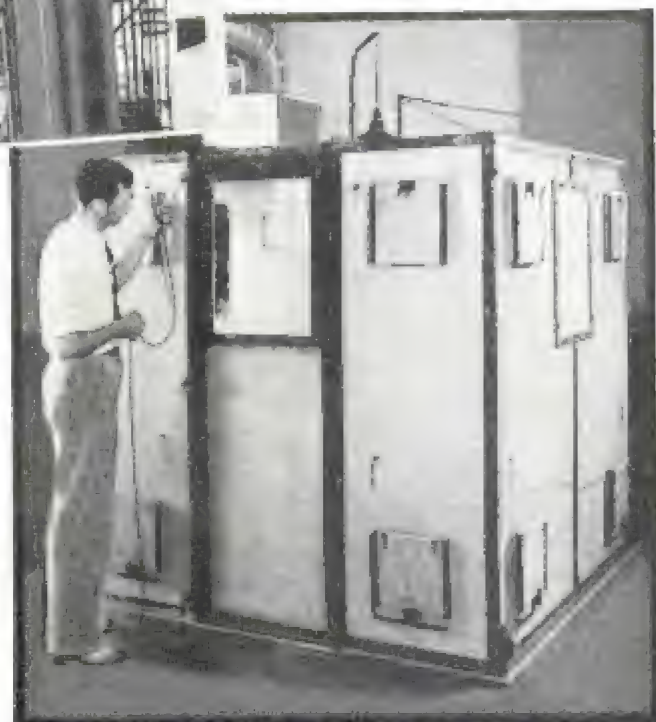
One oil company is manufacturing sulphuric acid from its waste by-products, one of its plants being capable of turning out eighty-five tons of acid every day. Other major oil companies are producing alcohol from their waste gases. It is estimated that the industry is producing 4,000,000 gallons of methyl, ethyl, and other alcohols every year, cheaper and in some cases practically the same as the alcohol produced from grain. A radiator anti-freeze called ethylene glycol is still another derivative. In some oil fields iodine is manufactured from the salt water flowing up with the oil from the ground.

This growth is taking place because petroleum chemists are finding dozens of

answers to the question of what to do with waste refinery gases. Ordinary crude petroleum consists of large numbers of molecules of different complexity, each type being a different combination of hydrogen and carbon atoms or arrangements of them. The lightest ones are gas molecules, heavier ones are just right for motor fuel, and still heavier molecules are used for lubricating oil. Straight-run gasoline is produced by heating petroleum until the gasoline molecules evaporate. Then they are collected in a condenser. It amounts to a sort of screening process.

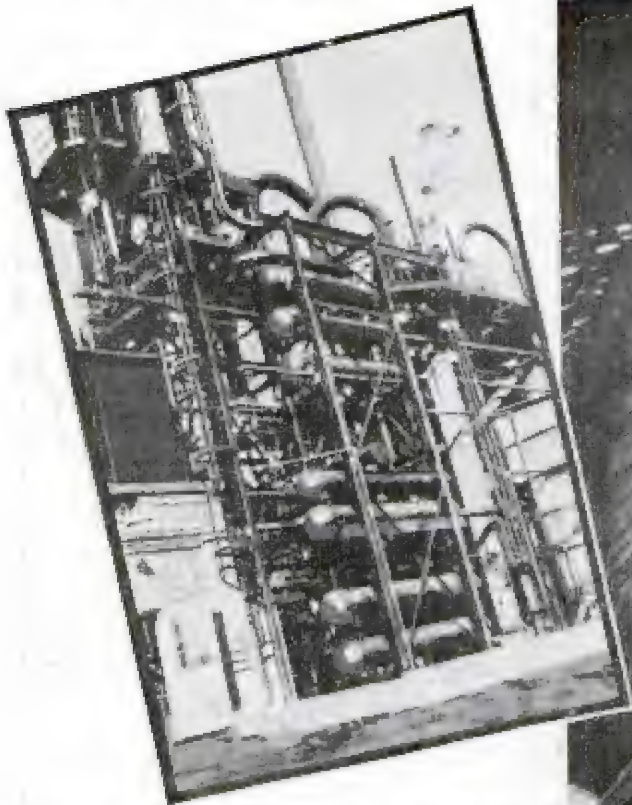
Potentially there is still a lot of gasoline left in the petroleum after the first run fuel is distilled off. The next step is to crack the oil, cooking it under heat and pressure to break some of the heavy frac-

tions down into molecular sizes that fall into the gasoline classification. In doing this, large quantities of gas are created and in the past these gases were simply piped away a safe distance and burned. These waste gases consist of mixtures of so-called saturated paraffin gases such as methane, ethane, and propane, as well as a number of other gases that are



*Bottom, measuring efficiency of petroleum fly spray on flies confined in spray chamber*



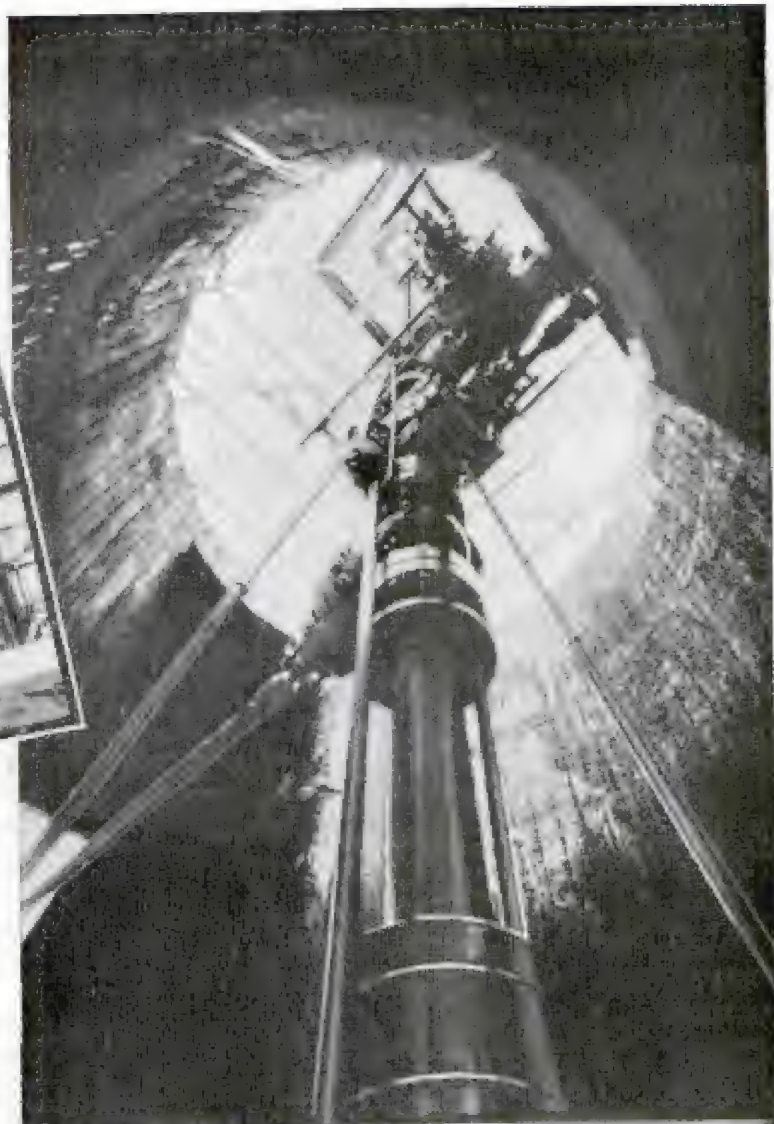


*Above, horizontal cylinders in which different grades of gasoline and oil obtained in cracking petroleum are caught*

called unsaturated because they are still capable of sopping up additional hydrogen atoms. One of the obvious things to do with the waste gases was to split their molecules apart and combine some of them into heavier molecules suitable for motor fuel. This process, called polymerization, produces from three to six gallons of extremely high anti-knock gasoline from 1,000 cubic feet of waste gas. In polymerization the gas is heated to 400 degrees Fahrenheit in an electrically heated tower and is subjected to pressures of 200 pounds per square inch. Polymerized gasoline has an octane rating of as high as eighty and is used as a blend for bringing up the anti-knock quality of lower-grade fuels.

By a more round-about process it is possible to manufacture gasoline that has an octane rating of 100 and that is regarded as a super-fuel that every motorist will be able to buy in a number of years from now. With the proper

(Continued to page 316A)

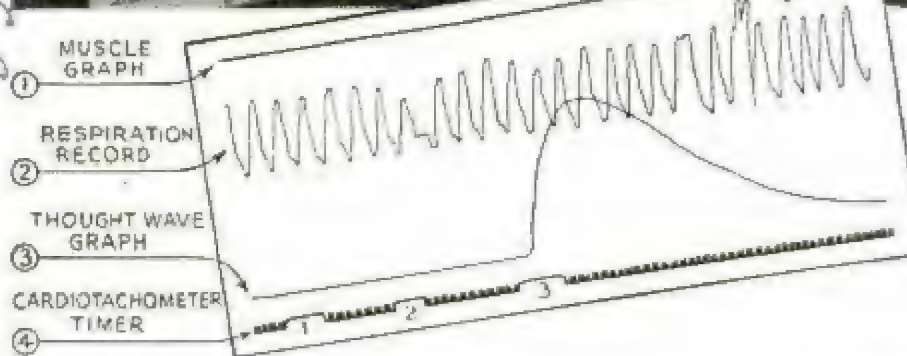
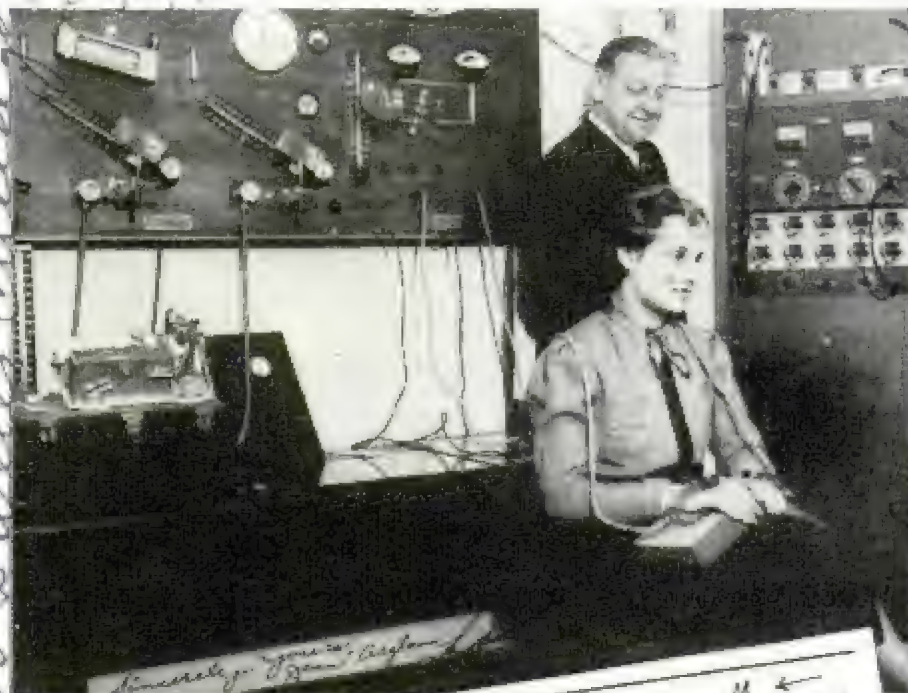


*Top, right, looking up into the top of an oil derrick. Bottom, experimental plant for extracting asphalt from crude oil*



1935 Evans  
Two Rivers, Wis

## 'Thought Wave' Lie Detector Measures Current in Nerves



Top, subject under test. Below, graph showing changes in thought wave and respiration lines when subject falsely answers question

Measuring differences which occur in the flow of minute electrical currents through the nerve fibers as emotional stress varies, a new lie detector is said to reveal the moment at which the subject utters a falsehood. Emotional stress generates more electricity, according to the inventor, thus causing a difference in flow of electricity along the nerve fibers, a change which is recorded by the machine. The detector produces four graphs, one charting muscle movement, another respiration, the third showing change in flow of current and the fourth registering the length of time a subject takes in answering a question.

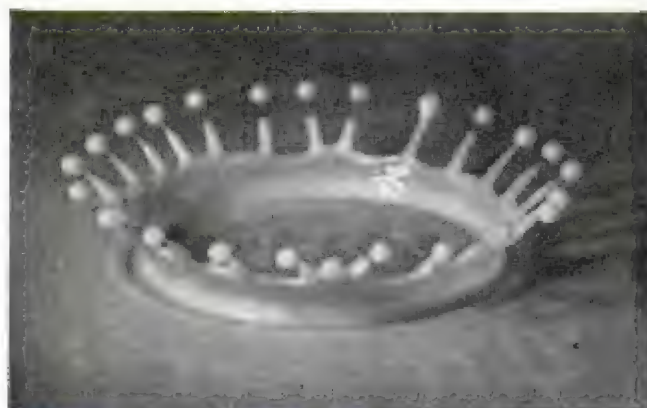
## "Electric Eye" Dental Cabinet Opens as Finger Points

Any of six instrument drawers in the latest cabinet may be opened when the

dentist points his finger at the one desired. Controlled by photoelectric cell, or "electric eye," an electric motor pushes the drawer open. This makes it unnecessary for the dentist to touch the drawer knobs and thus increases sanitation. The ordinary drawer knob is a source of infection because the dentist frequently transfers germs to the knob, no matter how careful he may be. In most cases it is practically impossible to sterilize the knobs between each treatment.

## High-Speed Camera Captures Coronet of Milk

You might call it "sculpture in milk," this liquid coronet that was shaped and then vanished too fast for the human eye to see. A drop of milk fell about seven inches onto a plate covered by a thin layer of milk, raising this crown-like ripple with its tiny jewel droplets. It was captured by a high-speed camera with an exposure of 1/100,000 of a second at f40, on a five by seven inch film.



Drop of milk falling into a plate of milk formed jeweled coronet caught by camera in 1/100,000 second

Harold E. Edgerton  
69 Massachusetts Ave

National Detection of Reception Institute  
330 South Chicago  
Chicago, Ill.

Cambridge, Mass



# Fountain Pen 'Scratch' Roars in Writing Test

Defects in a fountain pen are detected by equipment which amplifies the pen's "scratch" into a roar. By writing on paper on a disk mounted upon a special electric cell, the test operator sets in motion mechanical vibrations which are translated into sound vibrations. These sound vibrations, after amplification, are heard over loudspeakers. The smoother the pen, the "cleaner" the sound, or the greater the absence of undesirable harmonics. Thus, the "musical" note of the pen denotes its individual smoothness. At the same time a dial gives a visual check, showing the exact degree of scratching. The equipment contains crystals which are disturbed by vibrations. These disturbances set up varying currents, very

tiny, which are proportional to the vibrations. A set of earphones enables the operator to detect high-frequency scratches and to eliminate outside noises. The test makes possible the correction of defects before the pen leaves the factory.



Test operator writes on paper lying on special disk and sound of the pen's "scratch" comes out of the loudspeaker at left

## Daring 'Passenger' Balances Racing Motorcycle on Curve



Around the curve at high speed goes the motorcycle while the "passenger" balances the vehicle by this daring maneuver

Expert handling of his own weight enabled the passenger to help balance the motorcycle in coronation races in England. As the speeding cycles rounded curves the passengers in each leaned far to the inside in a daring maneuver to prevent an upset. Photographers caught unusual pictures, with rider and passenger each doing his part to preserve equilibrium.

There are 20,000,000 radio sets in America, 9,250,000 electric refrigerators, and 1,200,000 electric stoves, in each case about as many as in the rest of the world combined.



## Strip Across Road Counts Cars and Registers Hourly Total



**Chained to pole is traffic recorder which receives impulses as vehicle crosses strip laid on pavement**

No matter how fast and how close together cars are traveling on a multi-lane highway, each one is counted automatically by a portable traffic recorder which uses no "electric eyes." A weatherproof road strip is laid across the pavement, connected with a counting unit which operates on a six-volt storage battery, and every car that passes over the strip sends two impulses to the recorder and advances the total by one digit. Every hour the accumulated total is printed on a paper tape opposite the printed time, making a permanent record for traffic studies. The battery charge is good for registering 600,000 cars; a roll of paper lasts twenty-four days, and the clock mechanism is wound every eight days. Two cars driven at seventy miles an hour only five inches apart are tallied separately. Three-axle vehicles such as trailers register as one and one-half cars, but the half is not shown on the total until another trailer passes, so that two three-axle vehicles are recorded as three cars.

## Sea Clings to Its Mineral Riches as Bromine Is Extracted

Nearly \$100,000,000 in minerals flowed through a chemical plant on the Atlantic seaboard in the last twelve months, yet

only a fraction of this wealth was captured. The fortune in minerals was dissolved or suspended in the 158,735,000,000 pounds of ocean water pumped through a bromine recovery plant. All the chemists obtained was several thousand tons of bromine destined for treatment of gasoline. Science has thus far found no economical way to extract the \$42,000 worth of gold, \$29,300 in silver, \$33,200,000 in common salt, and other components of this sea water. Other unrecovered minerals in the year's pumping included enough magnesium to build 100,000 airplanes; potassium chloride to fertilize a million acres; 139 tons of aluminum, three tons of iodine, besides millions of dollars worth of Epsom salts, calcium chloride, strontium carbonate, iron, and copper. A square mile of sea water, eighty-nine feet deep, was pumped through the plant near Wilmington, Del.

## Fishing Reel with Spiral Shaft Winds Line Evenly

Equipped with a spiral shaft which winds the line evenly over the full width of the spool, the latest fishing reel reduces tangling and backlash. As casts are made there is nothing to restrict the line as it unwinds smoothly. The shaft has an oscillating rotary motion forward and back through two-thirds of a revolution to fifteen turns of the crank. The line naturally follows the low point of the spiral shaft, resulting in a level wind. Handle grips of the reel are shaped like a teardrop and are fastened at the blunt end. At high speed the grips swing straight out, presenting enough resistance to the air to cause a slight drag on the spool, preventing over-running. As the spool slows down the handles assume an air-flow position, offering less resistance, which results in a longer cast because the momentum of the plug or lure carries it to a greater distance. A thumb space on the reel allows the caster to get his thumb on the spool flange easily, giving more control than when the spool is thumbed.



teen turns of the crank. The line naturally follows the low point of the spiral shaft, resulting in a level wind. Handle grips of the reel are shaped like a teardrop and are

all June 1934. 808

Paper. Sells Co. 4101 Ravenswood Ave  
Chicago

Buffalo, N.Y.

Sea C

seaboard in the last twelve months.

*Spiral Wind Fish*

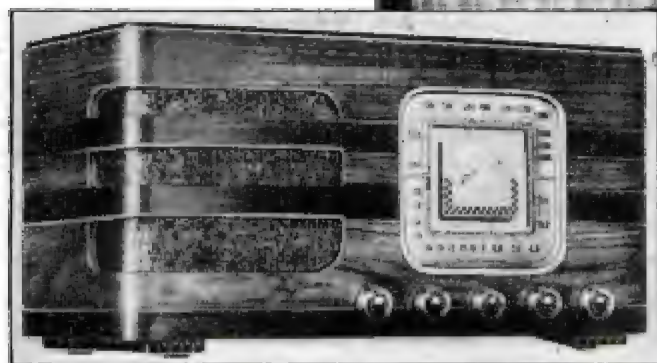




## RECEIVER *for* TRAILER, BOAT *or* HOME

**T**HIS 6-tube 2-band receiver can be operated on either a 6-volt storage battery or the regular 110-volt a.c. houselighting line. Although it closely resembles a table-type home set, as will be noted in the photo, it differs greatly in the fact that it also may be used in a trailer or a boat in locations remote from power lines.

It is easily portable and comes equipped with two attachment cords, one with battery clips for 6-volt operation, and the other a standard plug for a 110-volt a.c.



outlet. The "on" and "off" switching arrangement of the set is designed so that no possible mixup can occur resulting in fire-works due to wrong connections.

A built-in rubber-mounted synchronous vibrator unit furnishes the power supply on 6 volts and a 25Z5, half-wave rectifier, voltage doubler, is employed for power on 110 volts a.c. The tube filaments are auto-

matically connected in series for a.c. operation and in parallel for the 6-volt storage-battery supply.

Most owners of trailers and boats use ordinary 6-volt radio receivers constructed for auto installations. These are housed in pressed-steel cases designed only for use under an auto body or instrument board where they are out of sight; in many cases the speaker is a separate unit. Such installations on tables or shelves in trailers and boats lack eye appeal and the receiver is restricted to permanent location and limited usefulness. This all-purpose set is housed in a neat cabinet of the "lay-down" type suitable for use in the home. The speaker grille, tuning dial and controls are shown in the lower photo.

*Lafayette 6-volt.*  
*Wholesale Radio Service Co.*  
*101 6th Ave. New York*



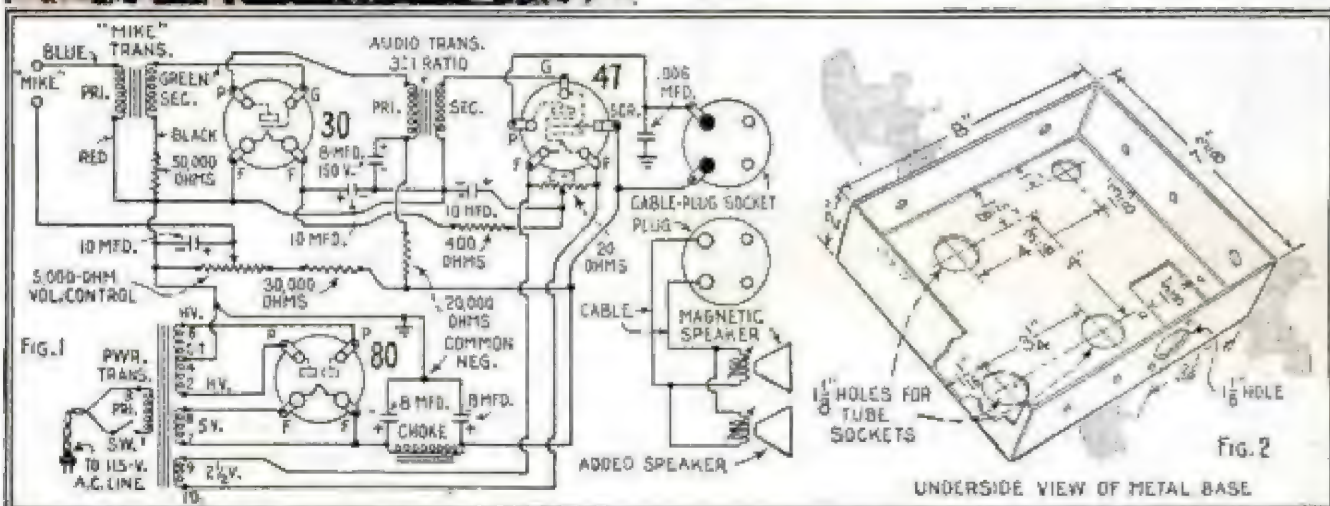
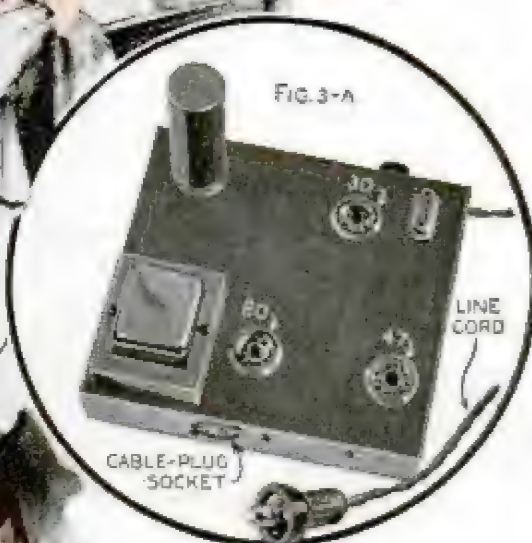
# How to Build

By M. N. Beitman

PERHAPS one of the most useful applications for a simple quick-heating amplifier is found in a call system where several small speakers can be used at remote points. The unit to be described operates on a 110-volt a.c. supply line and is designed to heat instantly. There is no waiting for the tubes to heat up, you merely throw the switch and talk into the microphone. It is suitable for all standard applications where a small economical unit with a maximum output of about 2½ watts is needed. It is especially adapted for

call systems in the home, shop, factory, garage and other places where individuals must be paged quickly.

The circuit is well filtered and the tubes are of the direct-heating type. Please note that one of the tubes is a type-30 battery variety, and in this circuit the filament is connected in series with the cathode return of the type-47 power-amplifier tube. Since this tube has an average plate current of about 40 ma., successful operation



UNDERSIDE VIEW OF METAL BASE



# a LOW-COST Call System..

is obtained with a rather unusual hookup. Of course, proper by-passing is necessary and this is taken care of in the circuit.

The assembly is simple enough for the beginner, in fact anyone who can use a soldering iron should be able to build it with no difficulty whatever. The schematic diagram appears in Fig. 1 and complete details for forming and drilling the metal base are clearly shown in Fig. 2. A simplified wiring diagram, Fig. 3, shows an underside view of the base with all parts in their relative positions. These parts are standard and available from any radio supply house, at low cost.

The power transformer is a half-shell type for sub-base connections; the (H.V.) high-voltage sec-

(Continued to page 142A)

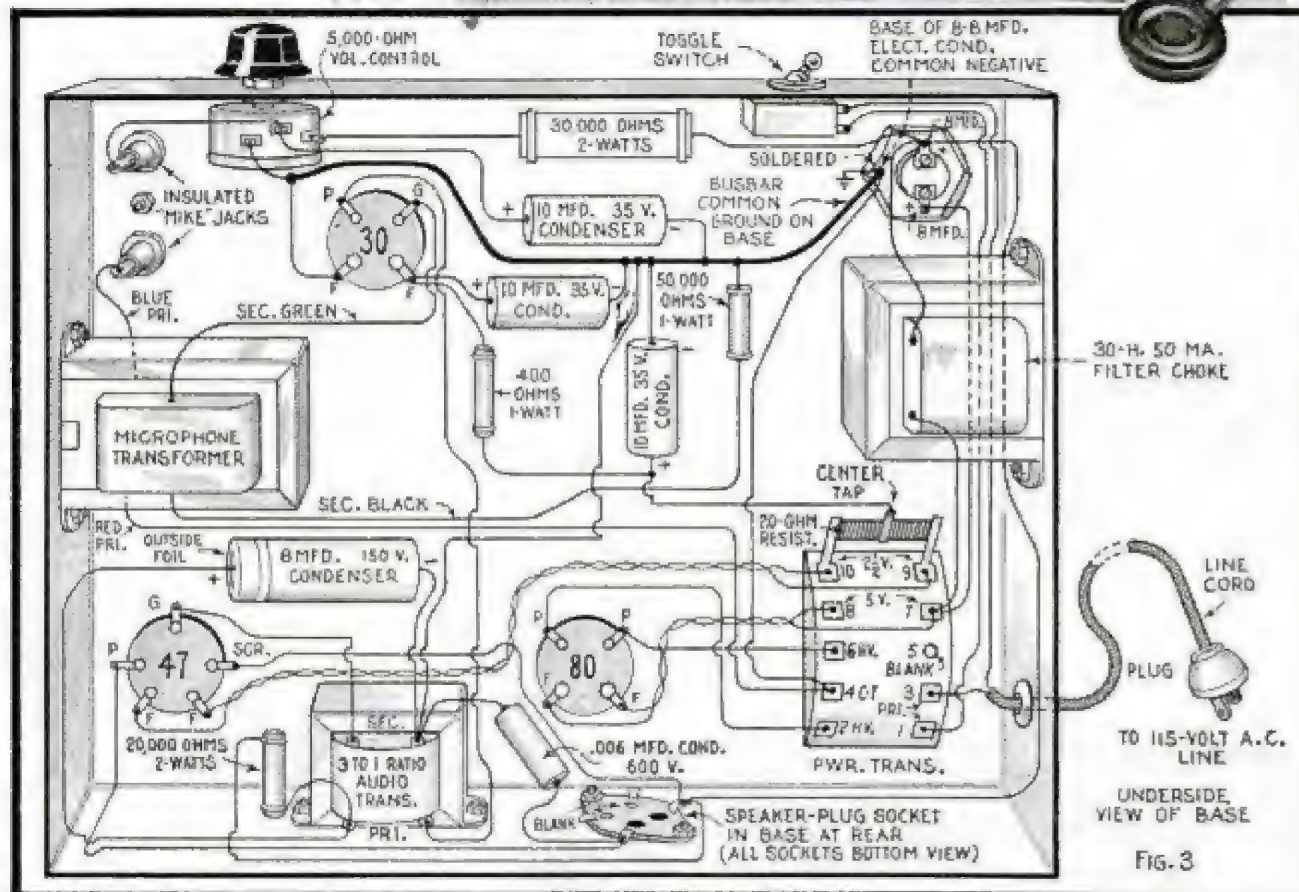
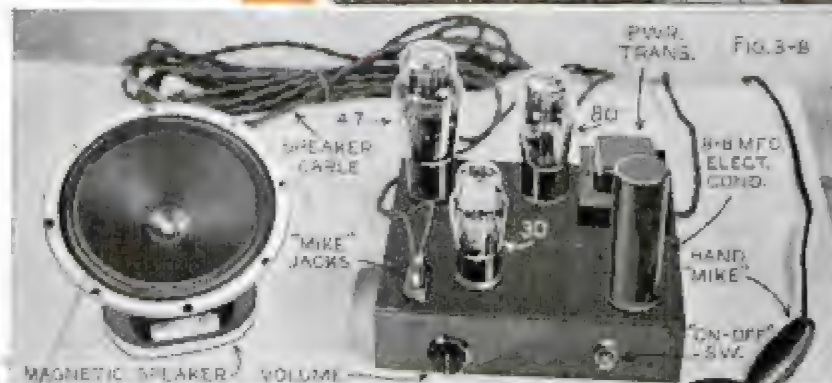
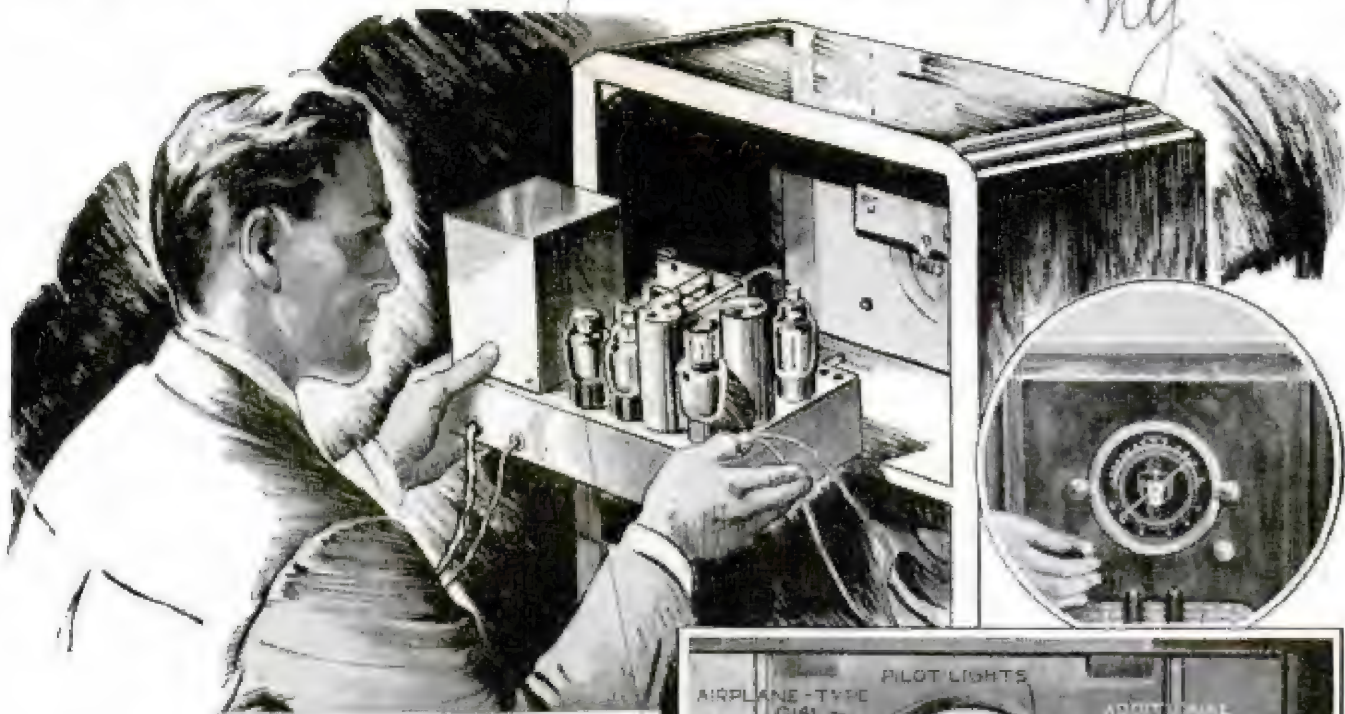


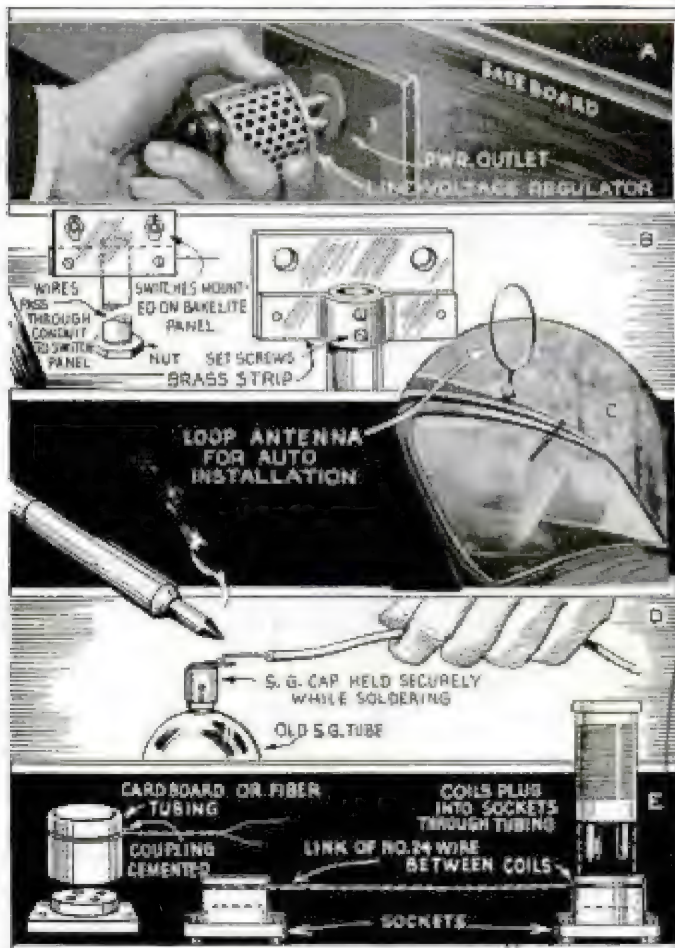
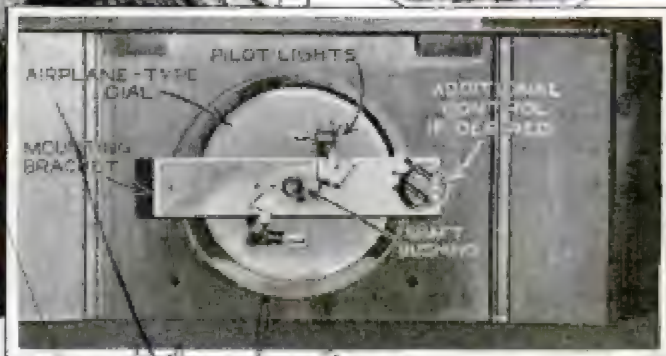
FIG. 3



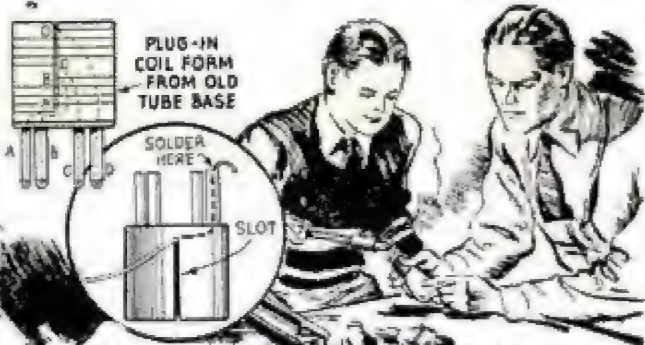
# Easy Solutions for Everyday Radio Problems



Large airplane-type dials can be installed in many varieties of old consoles when a modern receiver chassis is substituted for an obsolete set. The photos at right show front and rear views of a 6-in. dial assembly; these dials are complete with mounting bracket and two pilot-lamp sockets. The volume control may be removed from the new set chassis and mounted on the dial bracket as shown



Left, (A) line-voltage reducer brings high line voltage down to safe limits for your receiver. Voltage is being stepped up in many localities. If yours checks above normal some protection for the set is advised; (B) extension mounting for switches, pilot lights or similar controls on your workbench; (C) airplane-type ring antenna for auto-radio receiver installation, easily mounted on top, running board, door hinge or bumper; (D) tube cap placed on old screen-grid tube held upright in socket, frees both hands for soldering lead wire, thus preventing burned fingers; (E) fixed-link-coupling arrangement for small transmitter permits easy changing of coils as the connecting link is permanent. Short lengths of cardboard or fiber tubing hold the coupling links in position while the coils may be plugged in and out. Below, old tube bases make good shortwave coil forms. Melt and shake out solder from ends of tube prongs; alcohol will loosen cement so that bulb can be removed. Sketches show hacksaw-slot suggestion for bringing coil leads to prong ends



Walter B. Peltier



# HIGH FIDELITY

## *Speaker Cabinet*

is **HOMEMADE**

DESIGNED for high-quality reproduction, this home-made loudspeaker cabinet is not difficult to build and can be finished to harmonize with other furniture in the home. It gives a 10 or 12-in. dynamic-speaker unit a real chance to perform at maximum efficiency. The possible undistorted output is sufficient to fill a restaurant, dance hall, church or even a small auditorium if desired. It may be used with any good amplifier, or receiver, having a sufficient number of tubes to operate a dynamic speaker correctly.

The cabinet has no resonant points from 2,500 cycles down to 50 cycles, owing to careful design and the selection of materials. All important dimensions are given in Figs. 1, 2 and 3; the diagrams are self-explanatory but require a little further comment. It will be noted that the front panel and sides each consist of

(Continued to page 146A)

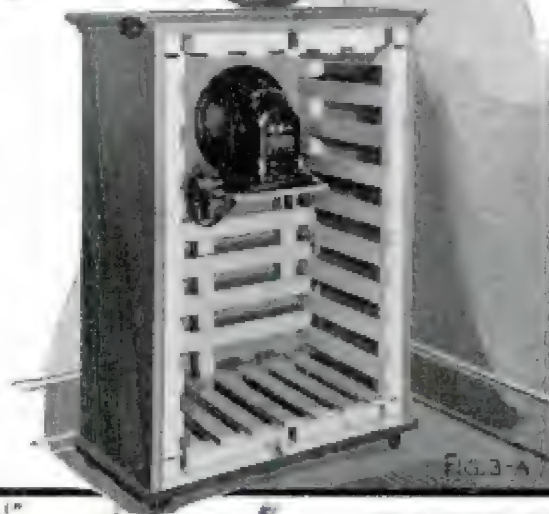
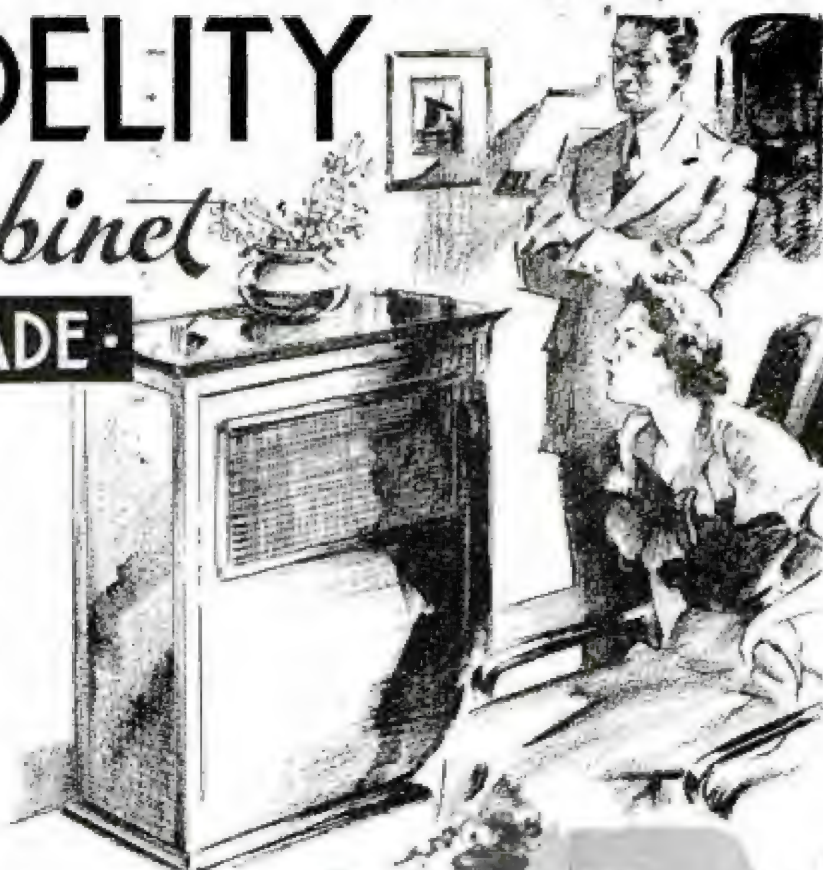
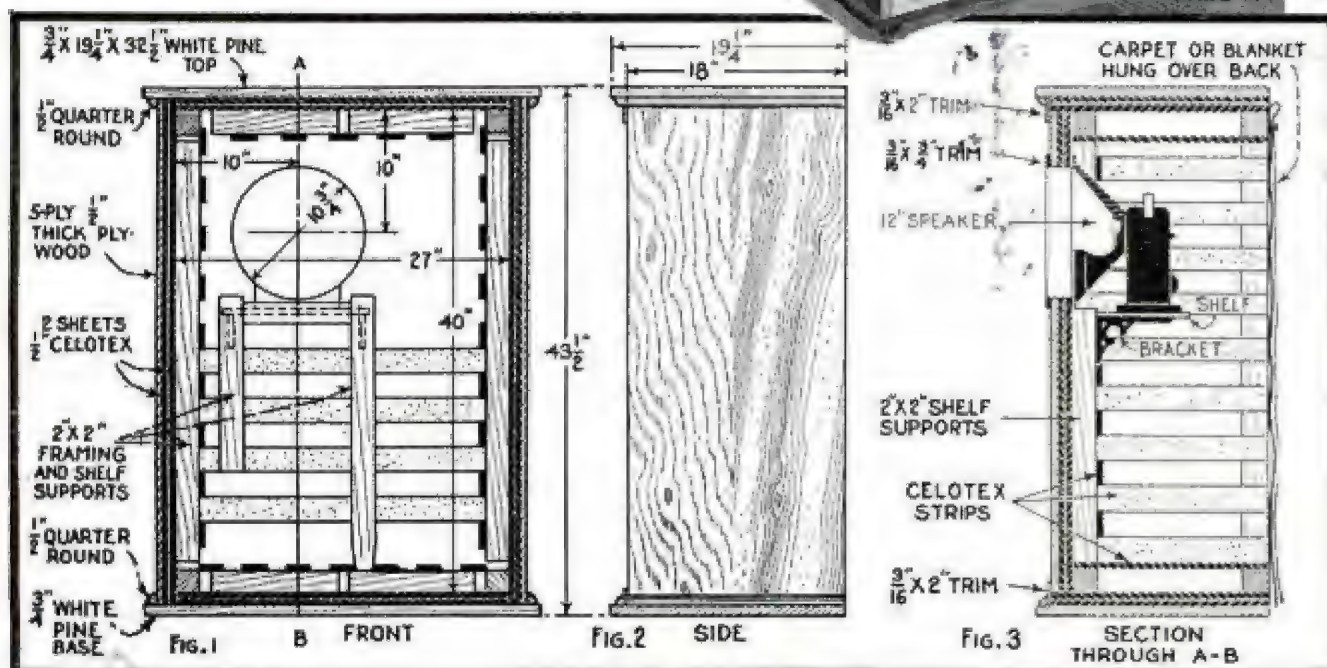
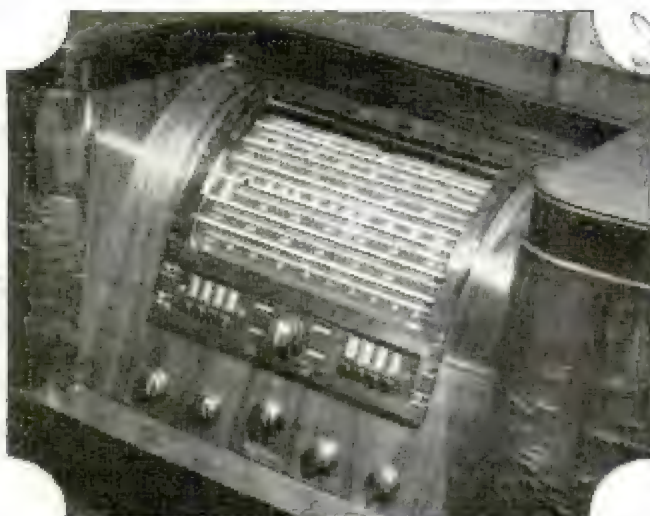


FIG. 3-A





## Improved Radio Tuning Dial Looks Like Cash Register



This advanced type of tuning dial is used in one of the new all-wave receivers. The space on the dial for short-wave stations has been spread out 50 times. Prominent stations are marked on each band to make tuning easier on overseas programs. Automatic tuning is provided for in the broadcast band, by means of push buttons. There are eight of these buttons that may be adjusted to any eight pre-selected stations in the regular broadcast band. The set is housed in a console cabinet.

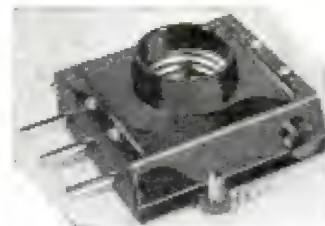
## Microphone for Heartbeats

Crystal-type microphones are now used for pick-up of heart and chest sounds for reproduction or recording. Extremely faint noises can be heard clearly with this little unit which is designed to replace the ordinary stethoscope. It employs a non-acoustic piezo-electric crystal in a manner that permits the unit to be used near loudspeakers without feedback.



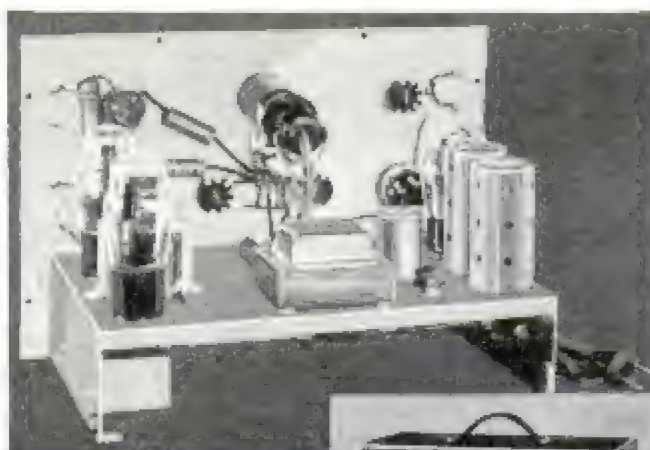
## Timing Switch in Light Socket

Although not much larger than an ordinary light socket, this unit contains the mechanism that controls the timing, sequence and grouping of lights for many useful applications. Prongs and jacks are provided so that the unit may be joined with others and plugged into the electric outlet.

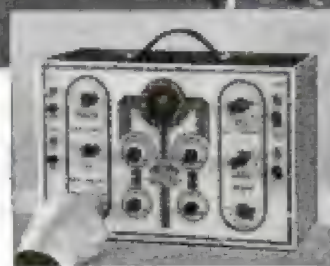


## Three Test Instruments in One

By combining a 1-in. cathode-ray oscillograph, thyatron linear sweep and electronic wobulator in one instrument, this unit offers the radio service man a means for silent set analysis. It provides for visually alining and balancing receivers.



Above, rear view of chassis assembly. Right, complete portable unit, showing controls



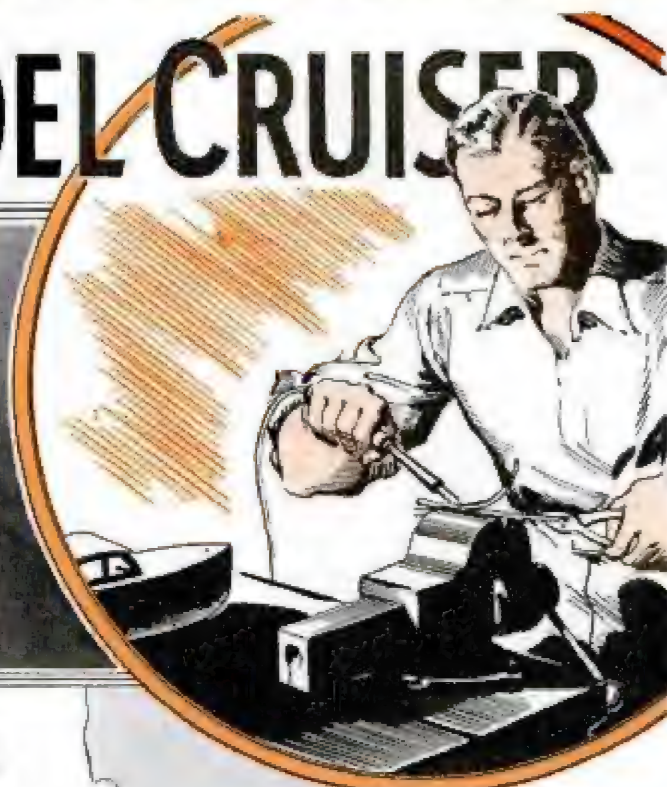
Blueprints covering radio construction articles in past issues are available for 25 cents each; original material lists and additional information can be obtained from our Radio Department without charge upon receipt of postage.

**NEXT MONTH—How to Build an Eight-Tube Radio Balance.** Simplified construction details for an improved metal-locating device of tested efficiency, that any experimenter can build. Also—**How to Add an Audio Amplifier Stage to the One-Tube Flashlight-Battery Receiver of September, 1936.** Complete data for both units.





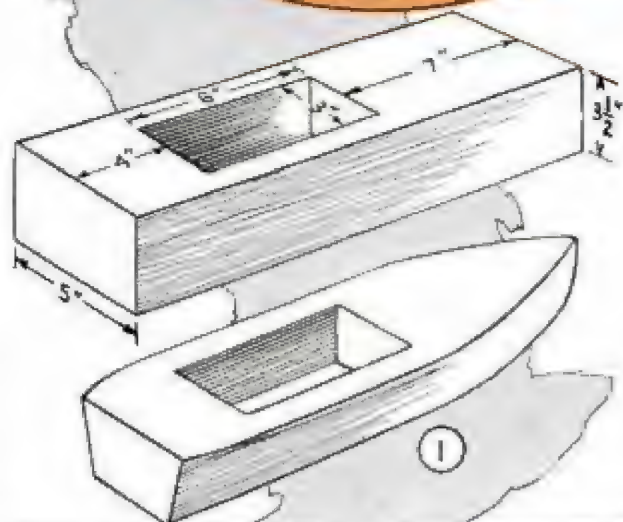
# ICE *drives this* MODEL CRUISER



**T**RAVELING about one-quarter of a mile on one filling of its four "boilers," this 17-in. model cruiser is propelled at considerable speed by gas, which is generated as Dry Ice or solid carbon dioxide melts in the boilers, and escapes under water through a jet at the rear end of the rudder.

Carved from a block of balsa wood as in Fig. 1, the hull is shaped on a sanding disk, Fig. 2. A well to hold the boilers extends through the hull from top to bottom so that the lower ends of the boilers touch the water to help speed melting of the ice. All exposed surfaces of the hull should be sanded smooth and then given two coats of glue sizing, followed by a coat or two of paint to prevent the wood from absorbing moisture and becoming water-logged.

After completing the hull, a cabin is provided to hide the boilers and to help give the model a streamline appearance. Fig. 4 gives the shape and sizes of the cabin pieces, which are soldered together and then hinged in place near the stern. The model is now ready for the boilers, which are made from tin cans and installed as in





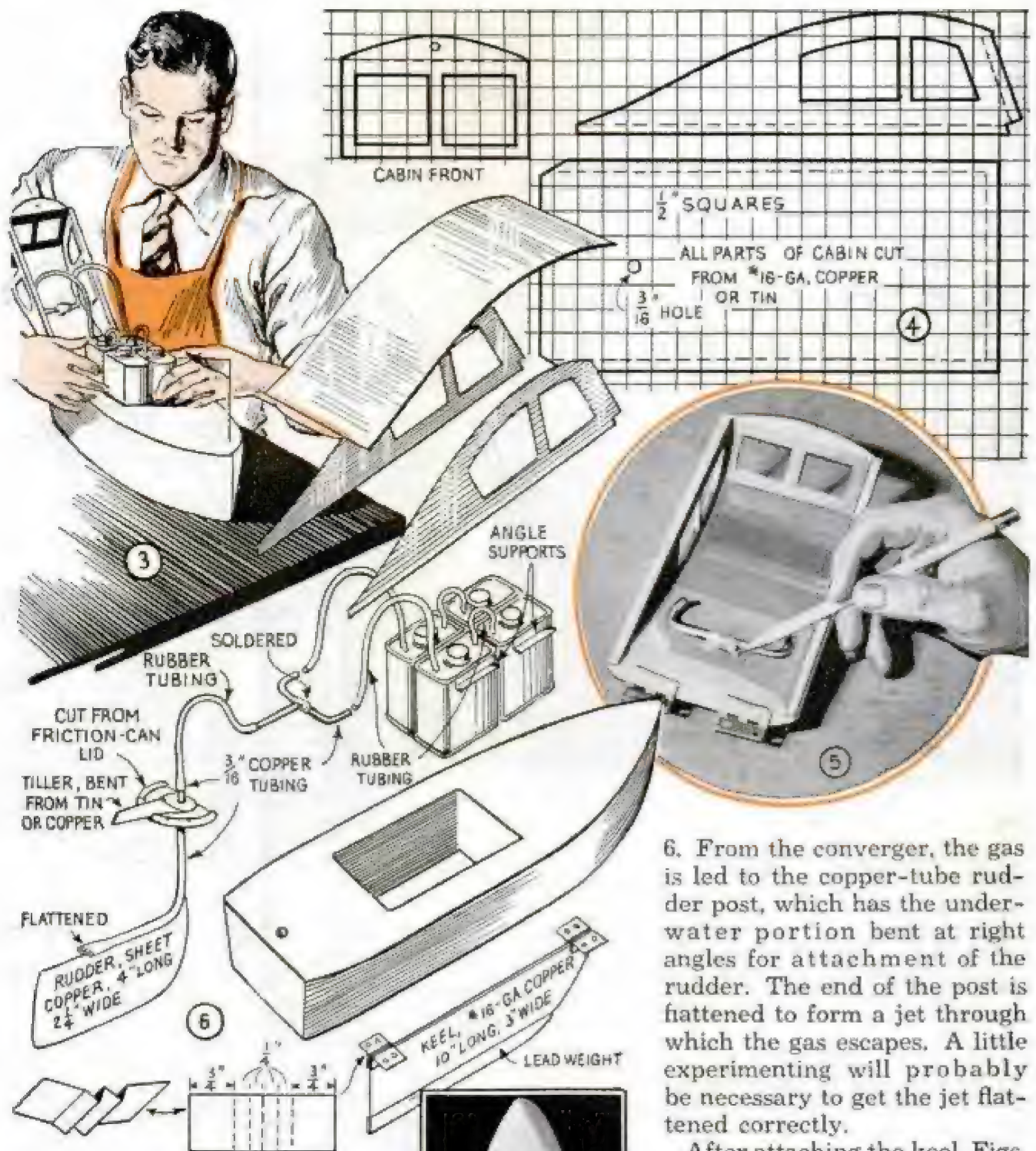


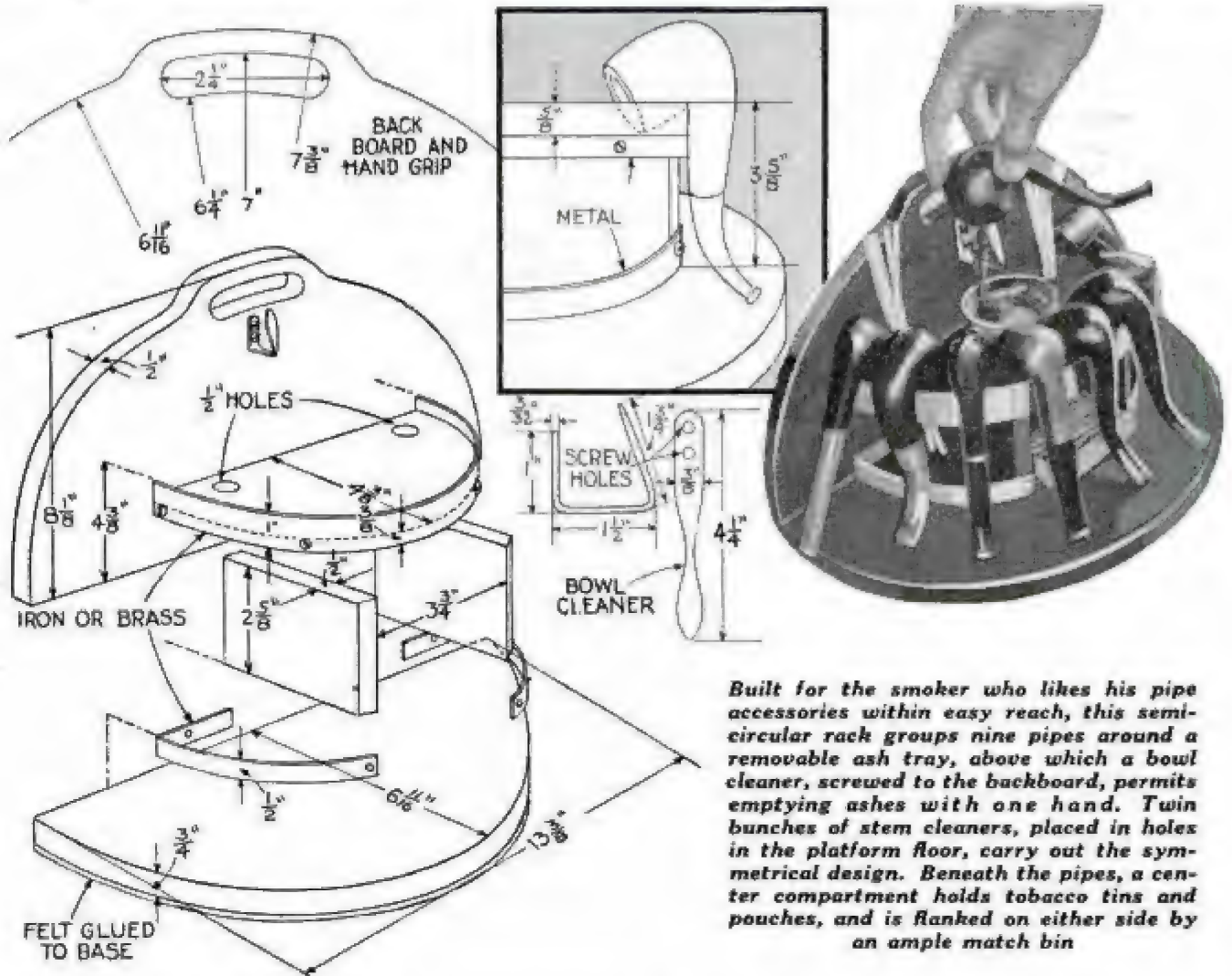
Fig. 3. The cans are approximately 4 by 3 by  $1\frac{1}{2}$  in. in size. Each one has a copper angle soldered to one side near the top to support it in the well. The boilers are connected together by copper and rubber tubing as in Fig. 6, two tubes from the rear cans leading to a converger, which is soldered to the roof of the cabin as in Fig. 5. The converger is made from three lengths of copper tubing to form a T-shaped connection as in Fig.

6. From the converger, the gas is led to the copper-tube rudder post, which has the underwater portion bent at right angles for attachment of the rudder. The end of the post is flattened to form a jet through which the gas escapes. A little experimenting will probably be necessary to get the jet flattened correctly.

After attaching the keel, Figs. 6 and 7, you are ready for a tryout. The keel is screwed to the bottom of the boat and has a lead weight extending along the lower edge. If you can't obtain Dry Ice from any stores in your neighborhood, watch for an ice-cream delivery truck and see if the driver will sell you a couple of pounds. Always wear gloves when handling Dry Ice as it will blister your skin if you handle it bare-handed.



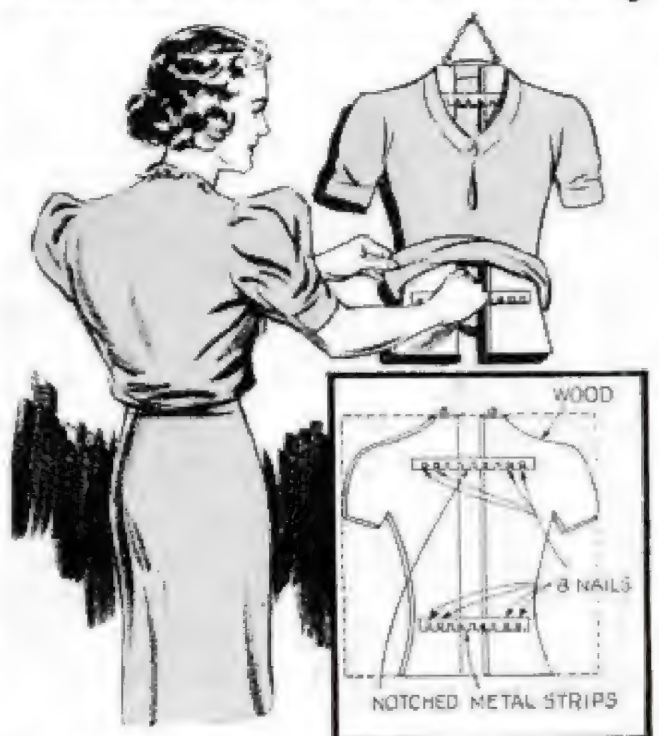
# Pipe Smoker's Accessory Rack Is Portable



## Women's Knitted Garments Blocked on Wood Dummy

After laundering their sweaters, knitted blouses or dresses, women will find this dummy very handy for blocking and drying them. Cut from 1/2-in. plywood, each half of the dummy is 20 in. long and 9 in. wide to the armpit. It is made adjustable in width by using two slotted metal strips, which fit over nails or screws driven into the wood as indicated. The edges of the wood should be sanded smooth and shellacked. In use, the dummy is slipped inside the knitted garment, and the two halves are spread to shape it, after which the slotted strips are dropped over the nails.

☞ Bacon will fry much better if it is soaked in cold water for a few minutes before placing in the skillet. This will lessen the tendency to shrink and curl. Put the slices in a cold skillet, turn often, and pour off excess grease as it accumulates.



You can block your knitted garments to a perfect fit by using this simple wood dummy



## Holder to Keep Pen and Ink on Filing Cabinet



*This holder will save steps for the file clerk who makes notes on papers kept in filing cabinet*

Instead of going to your desk for a pen every time something is to be checked off on a paper kept in a filing cabinet, why not use this holder to keep a pen and ink bottle always at hand on the cabinet? Made from thin sheet metal, the holder is bent to the shape indicated, after which a hole is drilled in the projecting metal to take the smallest part of the ink-bottle neck. Then a slit is cut from the edge of the metal to the hole. To insert a bottle, spring one edge of the slit upward and the other downward, so that the slit opening will be wide enough for the bottle to be slipped into the hole.

## Worn Depressions on Lock Key Repaired with Punch



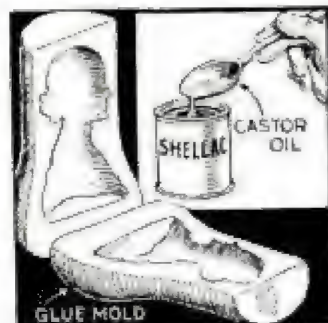
If the depressions of a paracentric key have been cut too low or have become worn, causing uncertain operation of a lock, they may be raised slightly with a center punch. The

punch is set just below the depression and is struck lightly with a hammer. This swells the metal slightly and tends to raise the bottom of the depression.

—J. Modroch, Detroit, Mich.

## Increasing Life of Glue Molds

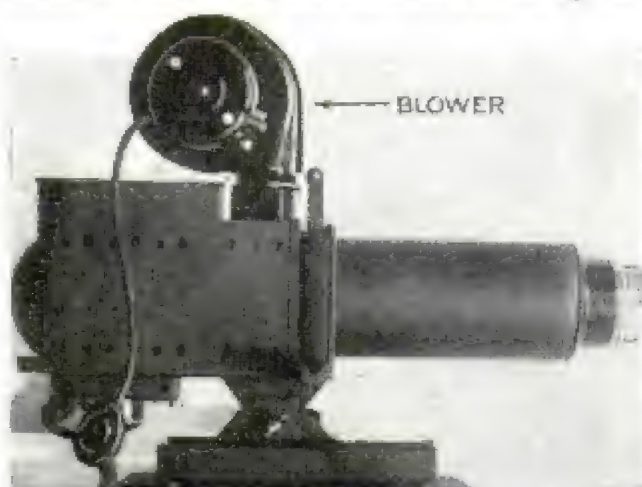
When using a glue mold to cast plaster-of-paris ornaments, coat the inside surface of the mold with a shellac mixture to make it last longer. To each 4 oz. of shellac used, add 1 tablespoonful of castor oil. Apply the mixture in three or four coats and let the last one harden for a few hours before using the mold.



This treatment makes the glue withstand the heat produced by the plaster of paris so that fine lines are not lost quickly. Instead of casting only three or four objects before remaking the mold, you can make two or three dozen.

## Blower on Projector Cools Slides

One instructor who used a projector fitted with a 500-watt lamp in connection with his lectures, solved the problem of over-heated film and lantern slides by us-



*Films and slides in projector are protected against heat of lamp by draft from small blower*

ing a blower to force cool air through the slide compartment of the projector. To install the blower, which was purchased from a dealer in hair-drying fans, a hole was cut in the top of the projector and a



short piece of heavy brass pipe was riveted over the opening to take the mouth of the blower tightly. Holes  $\frac{1}{2}$  in. in diameter were drilled in the bottom of the projector to permit the escape of air from the blower. It throws a stream of air directly on the slide. By means of a two-way connector, both light and motor are operated by the same switch.

—Dr. F. A. Carpenter, Los Angeles, Cal.

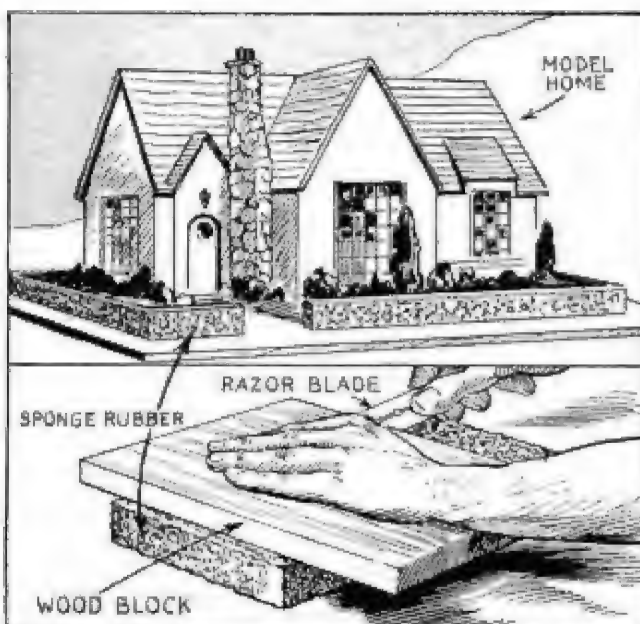
### Refinishing Straw Hats

The dull appearance of a straw or panama hat, caused by bleaching, can be removed by coating it with a mixture consisting of equal parts of high-grade transparent lacquer and thinner. Apply it with a brush, and be sure to mix it with thinner, otherwise you will have a finish that is too glossy.—W. Meinke, Santa Ana, Calif.

### Rubber Shrubs Add Realism to House Models

When making up a model of your proposed new home, why not go a step farther and landscape it? You can imitate shrubbery and hedges with sponge rubber, which can be cut to any shape or size easily with a safety-razor blade or pair of scissors. The rubber can be dipped into green stain or paint tinted any shade desired to help in working out your landscape color scheme.

—Edw. Hartel, Jamaica Plain, Mass.



Model shrubbery of sponge rubber aids in working out a landscaping scheme for your new home

### Chemist's Heated Filter Funnel Made at Small Cost

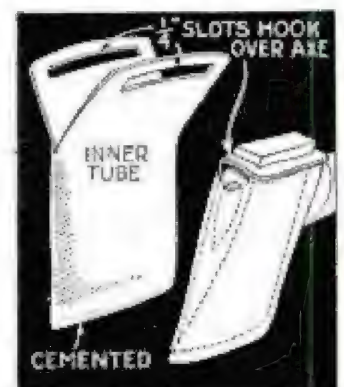


You can keep certain solutions from crystallizing while filtering them with this heated funnel

Amateur chemists who need a heated funnel to keep certain solutions from crystallizing while filtering them, can make one for a few cents. Just take a tin funnel considerably larger than your glass filtering funnel, and fit a rubber stopper tightly in the neck, first making a hole through the center of the stopper to take the stem of the filtering funnel tightly, and then assemble as shown. In use, fill the tin funnel with warm water and keep it hot with a burner directed against the outside.

### Axe Sheath from Inner Tube

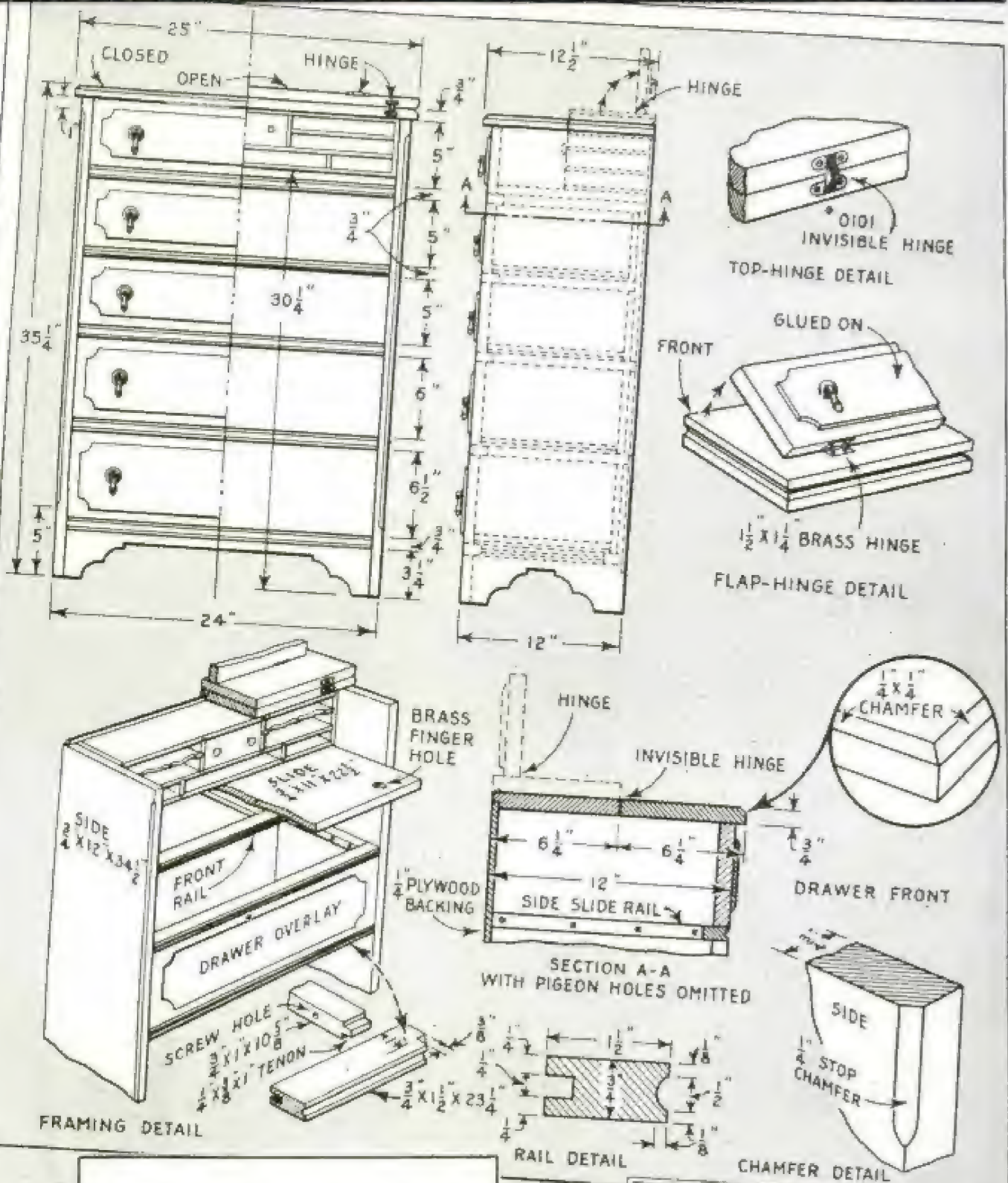
Why carry an axe unsheathed when it's so easy to make a sheath from a short piece of heavy inner tube? Just cement one end of the section of tube together, and slit it down opposite sides 2 or 3 in.



from the other end. Then cut slits in the flaps or ears thus formed, insert the axe blade and force the head through the slits.



# COMBINED CHEST *and*



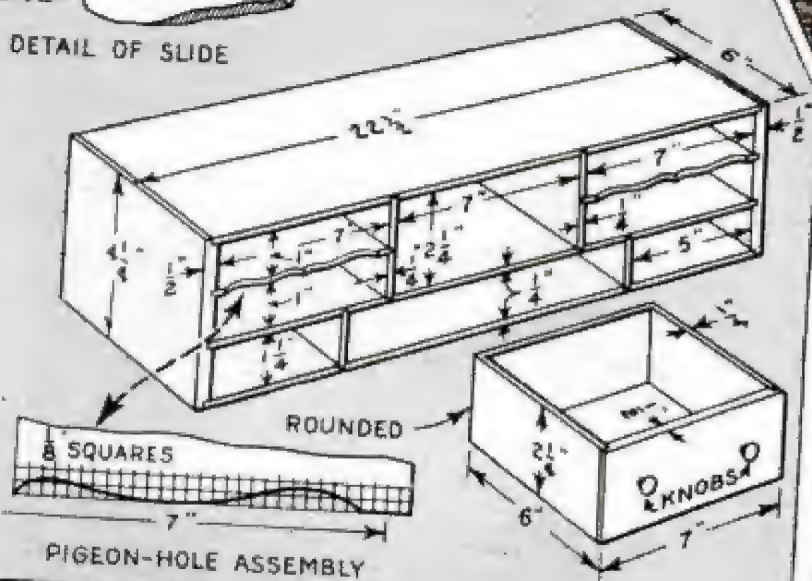
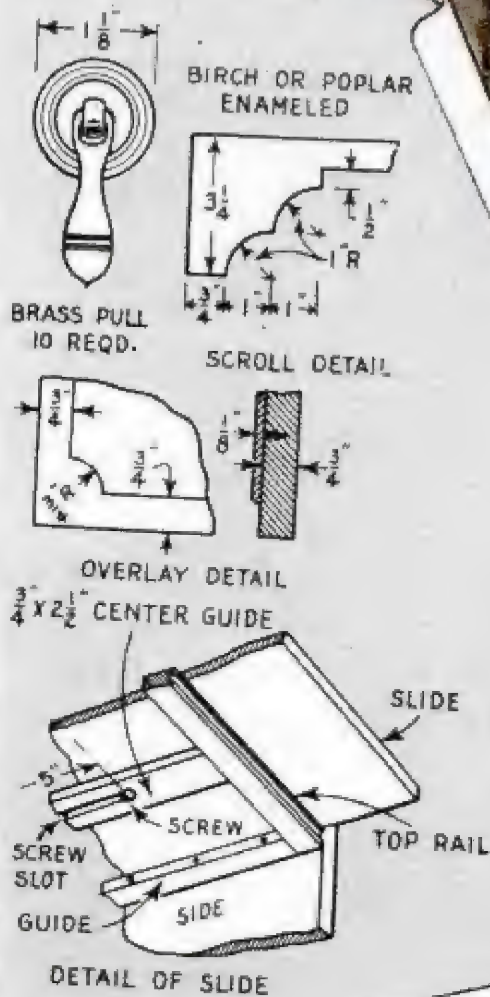
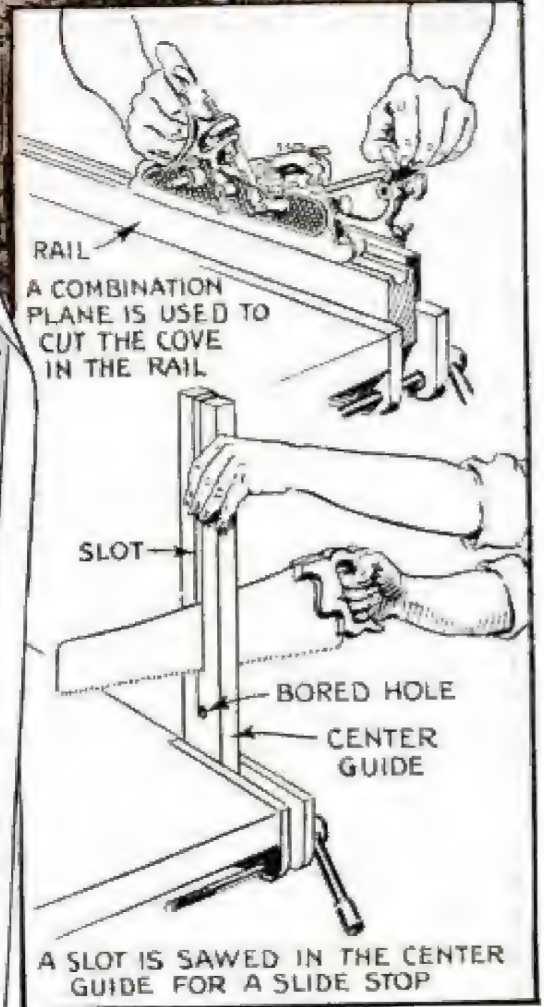
SCALE OF  
DESIGNED &  
DRAWN BY

*When closed, it's just an ordinary chest, with no clue to its double purpose. But when part of the front and top are swung back and a slide is pulled out, you have a convenient desk without dispensing with any drawer space below.*

**POPULAR  
MECHANICS**  
MAGAZINE



## WRITING DESK



SHEET NO. 1

ISSUE

POPULAR MECHANICS MAGAZINE  
200 E. ONTARIO ST. CHICAGO

BLUEPRINT No. SN 969



## Simplified Electric Motor Run by Magnets



*A dry cell and two electromagnets taken from a doorbell operate this motor*

Operated on a dry cell, this engine runs at a fast clip, and is a real thriller to the young engineer because all the moving parts are exposed. Two electromagnets taken from a doorbell provide the pulling power to operate the "piston" which is a piece of heavy-gauge sheet iron soldered to a connecting rod and drilled to slide on two pieces of heavy wire. Two ends of the wires are bent and screwed to the base and the other ends are inserted into shallow holes drilled into the cores of the magnets. The connecting rod and crankshaft are made of heavy wire and the crankshaft has two throws, one for the connecting rod and one for the timer, which is a strip of copper. The flywheel is made of wood and the crank assembly is supported by two metal brackets which serve as bearings, the assembly being held in place by the flywheel on one side and a small washer soldered to the crankshaft on the other side. In setting the timer, it should be in contact with the crankshaft from the beginning of a stroke until the piston reaches the end of the stroke next to the magnets.

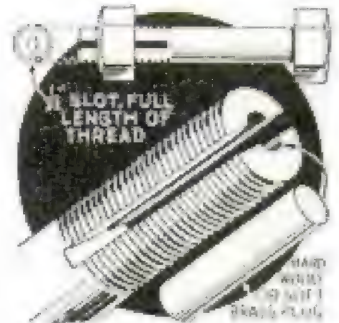
In operation, the current flows through the magnets to the bearing next to the flywheel, then through the crankshaft to the timer and back to the dry cell.

—Wilber S. Conger, Cleveland, Ohio.

## Nut "Wedged" on Bolt

In places where excessive vibration makes a lock nut ineffective in keeping a nut on a bolt, try the following method: First drill the threaded end of the bolt transversely through the center and slot it to the same depth. Then, after the nut has been driven on the bolt and drawn up tightly, a plug of hardwood or soft brass can be driven into the hole to expand the bolt snugly against the nut.

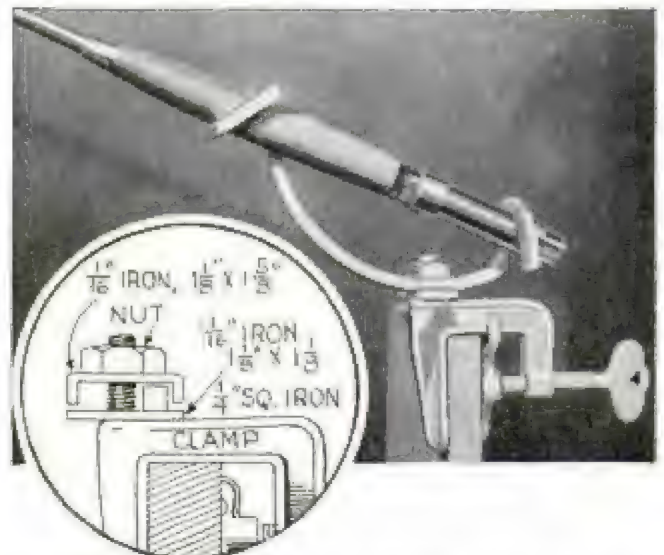
—E. V. Hatheway, Jackson, Mich.



## Fish-Pole Holder Clamps to Boat

Here is a holder that you can clamp to the side of your boat to hold the pole while still fishing. Utilizing a clamp taken from an old clothes wringer, the holder is made by bending a length of  $\frac{1}{4}$ -in. iron bar to the shape shown. The bar is held under the nut on the clamp by inserting it between grips made of thin iron as indicated in the circular detail.

—Archie Amos, Fort Wayne, Ind.

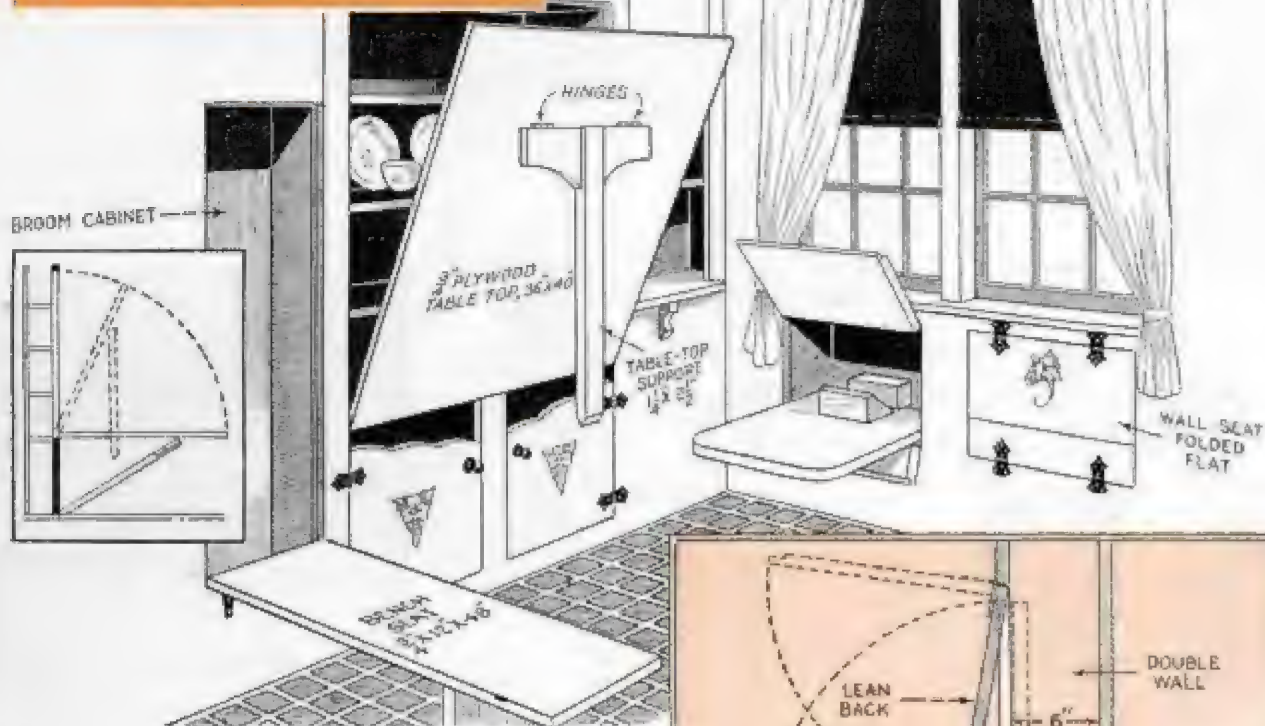


*Why tire your hands and wrists by gripping a pole while still fishing when this holder will do the job*

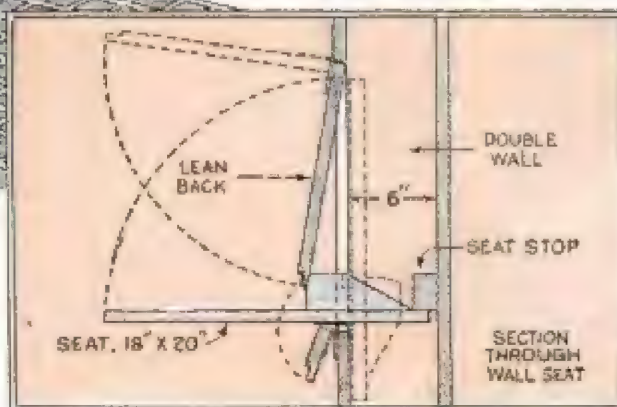


# TABLE *and* BENCHES

*fold into wall*

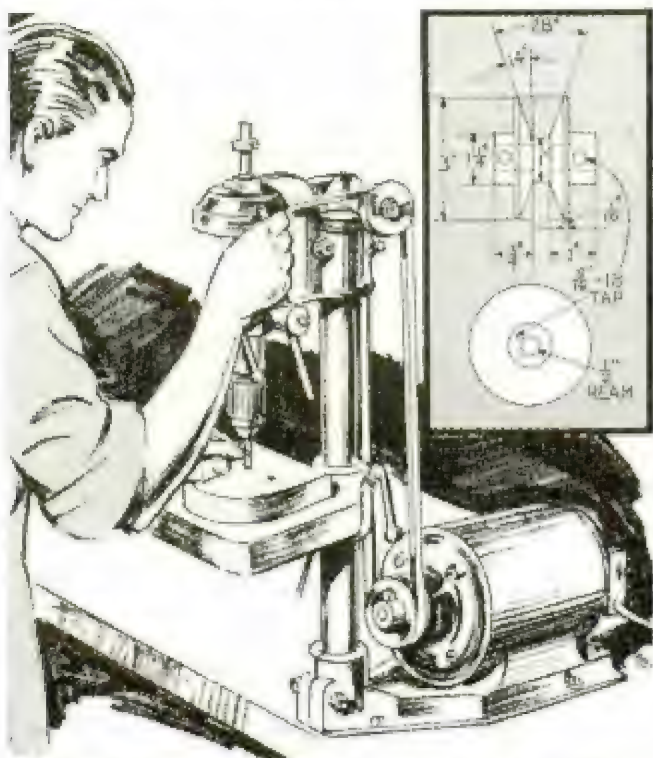


**Real spacesavers for small cottages and apartments!** When closed, the plywood table, with its single, hinged leg, conceals a china cupboard; the long bench at one side covers a broom closet, while two seats with back rests fold flush into a wall at the other side





## Adjustable V-Pulley Saves Time for Home Workshop Owner

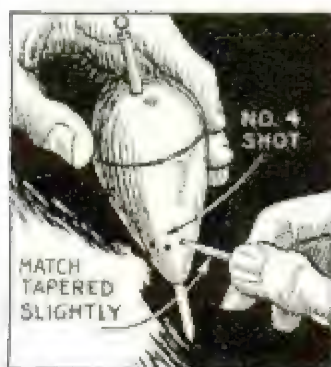


*To make this pulley larger or smaller, adjust one side to make the belt travel higher or lower on the flanges*

Instead of using step V-pulleys on machines that are driven at different speeds, such as drill presses and lathes, one owner of a home workshop uses a two-piece V-pulley, which he adjusts by simply loosening one side to make the belt run high or low on the flanges. Turned from cold-rolled steel, the pulley is made in two parts, the hub of each half being drilled and tapped for a set screw.

—M. B. Birge, Hinsdale, Ill.

## Fishline Float Is Weighted When Using No Sinker



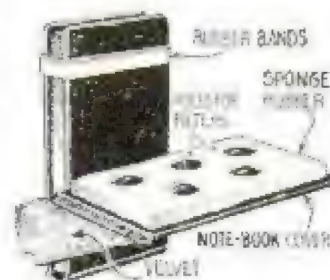
Fishermen who like to use a float for all types of fishing, and often find that it rides too high in the water, especially when a sinker isn't used on the line, can weight the float with shot to

make it ride in the water as desired. If the float is made of cork, the shot can be pushed into it near the lower end with a

tapered match stick. When a wood float is used, tiny holes can be bored into it and the shot forced into them in the same way. After inserting the shot, a daub of paint will keep water from entering the holes.

## Holder for Lenses and Filters

Made by gluing a piece of sponge rubber to the inside surface of one of the covers of a note-book binder, this holder will enable you to carry extra lenses and filters for your camera without damaging them. Before placing the rubber in the binder, holes are made in it to take the various items.

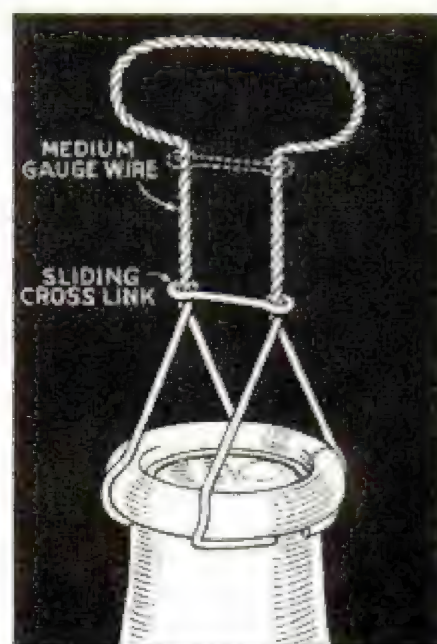


The holes should be a trifle smaller in diameter than the lenses or filters they are to hold so that they will not slip out easily.

—Harry Radzinsky, New York City.

## Milk Bottles Carried Safely

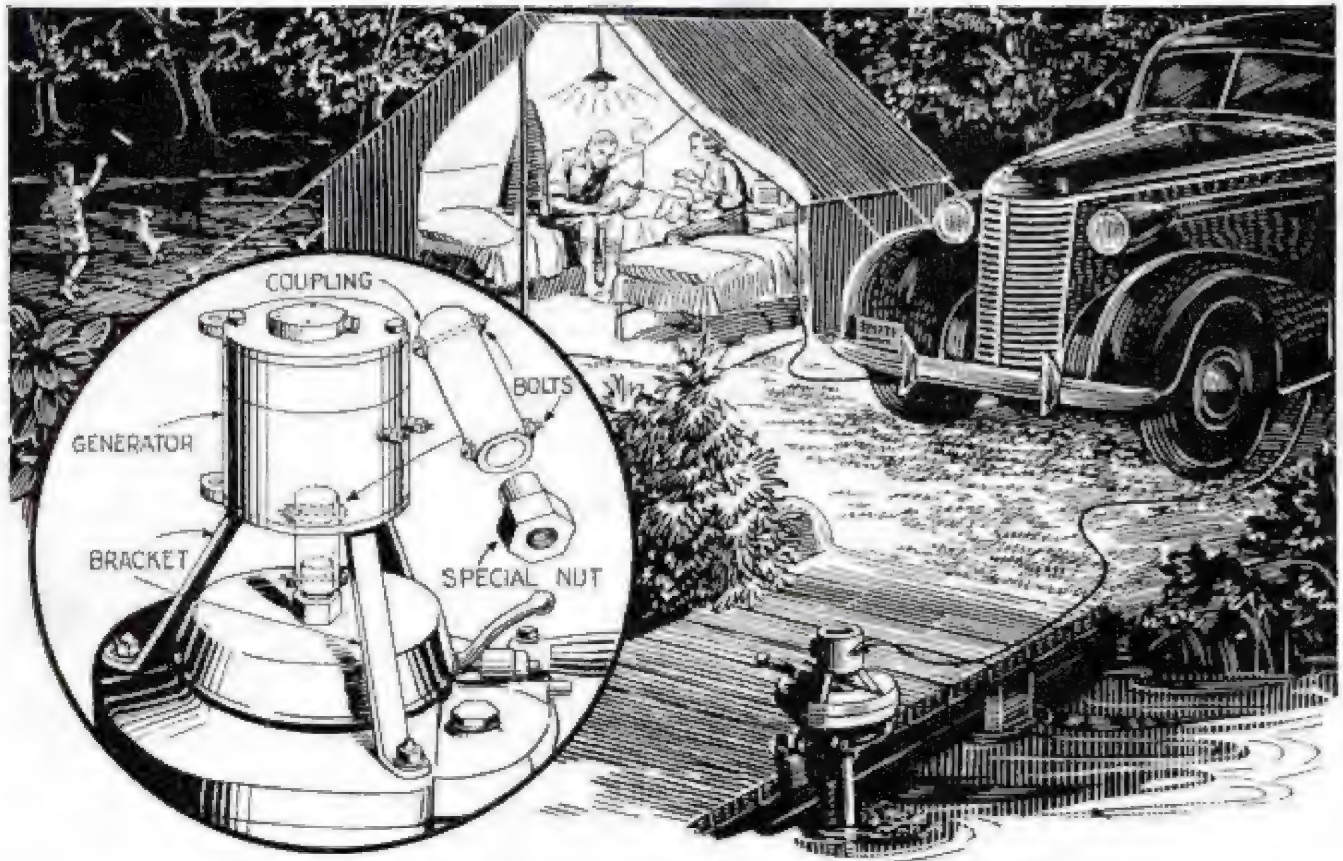
Here is a milk-bottle holder that grips the neck tightly just below the mouth so that it is easy to carry the bottle, especially for children. Two lengths of wire are twisted together and bent to form jaws as shown, and a cross link slides down on the jaws to hold them in place snugly.



*If you send your children for a bottle of milk, this carrier will lessen the risk of dropping it*



# Outboard Charges Battery for Camp Lights



Instead of running his car motor excessively to keep the battery charged, when using it to operate his camp lights, one camper lets his small outboard motor do the job. An old car generator, with electrical cutout attached, is mounted on top of the motor by means of flat-iron legs as indicated, and is connected to the motor shaft with a flexible coupling made from a short piece of garden hose. The legs are slipped under convenient nuts on the motor and are attached to the generator with cap screws or by brazing. If the shaft of your motor does not extend beyond the flywheel to take a coupling, your nearest machine shop can turn a special flywheel nut with an extension to take the hose. Also, it may be necessary to bush the end of the generator shaft to fit the hose tightly. Holes through the hose, generator shaft and motor shaft or special nut take small bolts to hold the coupling. To put the outfit into operation, remove the propeller from the motor and clamp it to the dock with the water-pump inlet extending into the water. Then run wires from the generator cutout and frame to the car battery and ammeter. If the motor rotates the wrong direction to operate the gen-

erator correctly, take the wire from the third brush and connect it to the main brush nearest it, converting it to a plain shunt generator. If the ammeter shows discharge when the generator is running, reverse the connections at the generator.

—C. E. Packer, Chicago.

## Film Data in Photometer Case Are Always at Hand

If you carry a photometer when using a camera, it's a good idea to typewrite the speed of various kinds of film on a piece of paper and fasten this inside the meter case where it will be at hand when needed. A piece of clear celluloid or blank film pressed over the paper will protect the printed data against marring.

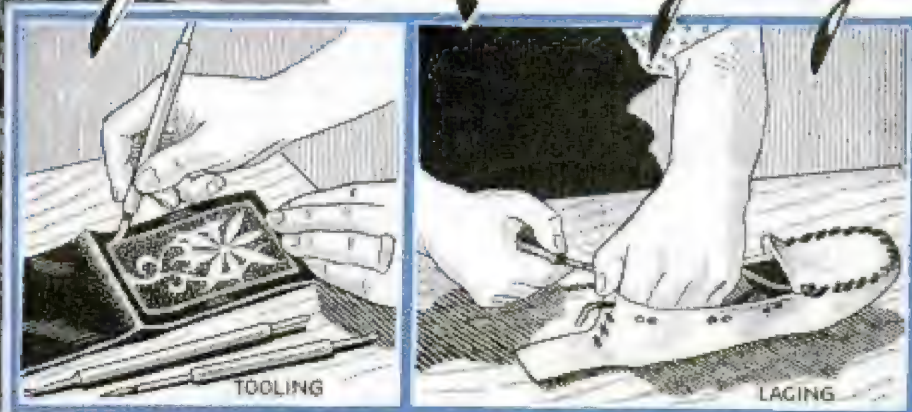
—Paul Rowden, Colorado Springs, Colo.



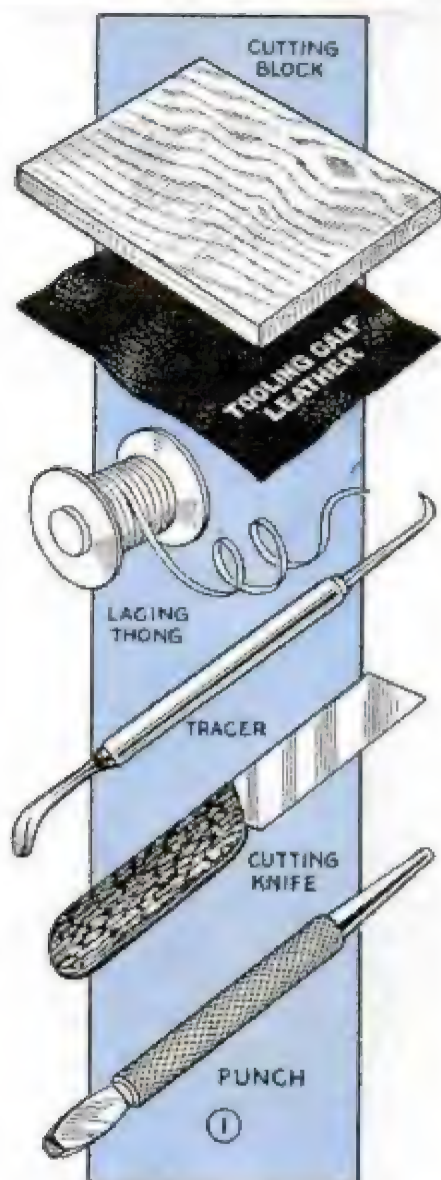




# You'll Enjoy



Overlaid pillows, neatly laced moccasins, braided belts and tooled billfolds are a few examples of the art work you can do



WITH leather available in so many beautiful colors, leather craft has unlimited possibilities. Any of the articles illustrated can be made with only a few inexpensive tools. The work is fascinating and easily mastered by anyone after learning the secrets of the craft.

Overlaying of one or more colors of leather on a background of leather is probably the simplest type of this work but also one of the most effective. By the use of contrasting colors striking effects can be obtained. The leather pillow, shown above, is an example of this type of work. The design is laid out on paper as shown in the squared drawing, Fig. 13, then thumbtacked over the leather and both pattern and leather cut out with a sharp knife. Suede lambskin is used for both the design and the background. Place the design smooth side up on the rough side of the background piece. Ordinary liquid glue, thinned slightly by placing the can in warm water, is used to mount the cut-out pieces. The glue is applied evenly over the rough side of the pieces, then scraped with a knife blade to remove the surplus. If any points fail to adhere after applying the cut-outs to the background, additional glue is applied with a small brush, as shown in Fig. 12. Should glue ooze out around the edges, wait until it is dry and then scrape it off with a knife. After the gluing has been finished, the design should be covered with tissue paper and then weighted down with a board loaded with some heavy object. A binding strip 1½ in. wide is folded over the edges of the cover pieces and the four thicknesses laced together with ⅛-in. lacing. Paper clips will hold the material together while lacing. Holes for lacing are spaced ⅜ in. from the edge and ½ in. apart. A simple running stitch is used.



# LEATHERCRAFTING



To make moccasins of the type shown in Fig. 6, a soft-tanned elk-skin is recommended. Two pieces are required for each moccasin. Fig. 4 shows the pattern for the sole while the left detail of Fig. 5 gives the pattern for the tongue. The lacing holes on the tongue are spaced closer than those around the toe of the sole, making it necessary to pucker the latter between holes. Because of the thickness of the material it is necessary to skive or bevel the edges of the sole pieces, as indicated in the upper detail of Fig. 5, so that the material can be puckered. Skiving is done by placing the leather along the edge of a board and using a sharp knife. The lacing holes are cut with an inexpensive leather punch as in Fig. 3. It has cutters for various size holes and a stop for spacing from one hole to the next and a given distance from the edge. The heel should not be punched until the moccasin has been fitted as described later.

As the holes are punched for a snug fit, the lacing must be pointed, and pliers used to pull it through the hole. Two colors of  $\frac{1}{8}$ -in. lacing may be used, about  $2\frac{1}{2}$  times as long as the distance around the toe. Start by pulling one half of one of the pieces of lacing through the holes at the front center of the toe on both the sole and tongue pieces. Pull the other lace through the first hole to the right of the first lace and proceed in a similar manner, lacing over and under with alternate colors of lacing next to each other as in the lower



detail of Fig. 5. Be sure to draw each stitch tight to pucker the sole between stitches. Proceed in this manner until hole B is reached, then end off by passing the lace through the last two holes twice, then under the last stitch, drawing tight and cutting off flush with the edge. Proceed in the same way on the left side. The toe is shaped up by filling with damp newspaper and working by hand.

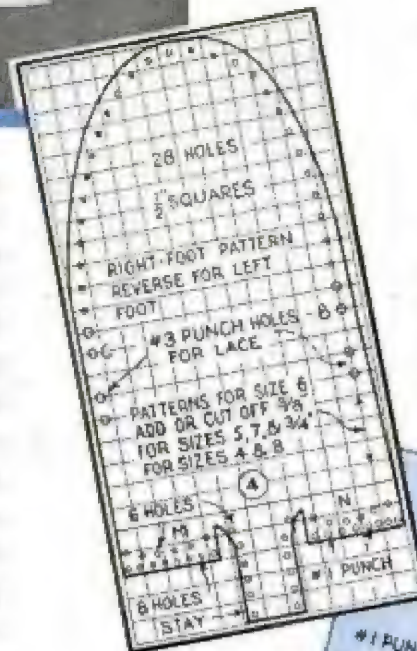
The moccasins should now be placed on the feet. Then, while standing, pieces M and N are folded around the heel to make sure that they just come together. In case these pieces overlap, the moccasin is too large and the whole pattern of the back should be cut in until a fit is obtained, after which the lacing holes are punched. The outside rows of holes are used to lace up the heel, after which the stay is drawn



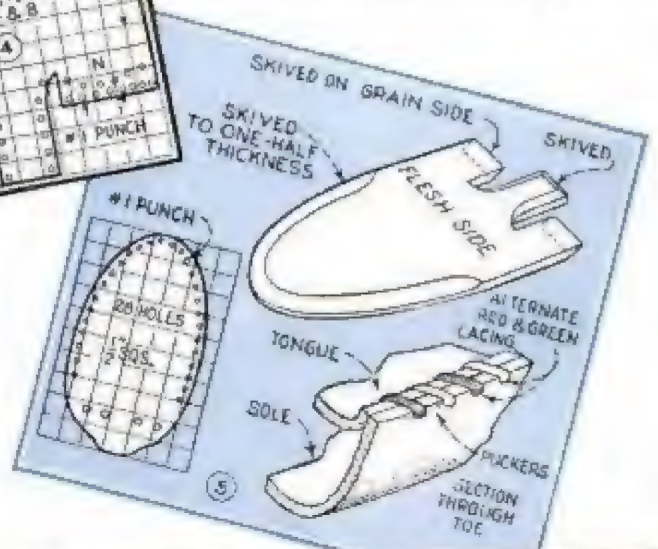


up and laced through the inside rows of holes. To finish the moccasins, insert the tie laces through the larger holes, beginning at the heel so the lace goes over the stay on the outside and ties at the center of the tongue.

Braided leather belts are easily made and very practical, as they are somewhat elastic. While braided belts may have almost any number of strands, the ten-strand type, shown in Figs. 8 and 9, is most popular. For this belt, get a piece of leather  $1\frac{5}{8}$  in. wide and one third longer than the required belt size. Starting 7 in. from one end, cut the leather into ten strands with a sharp knife and straightedge. Start braiding on the right side with the strand marked 1 in Fig. 8 and weave this over 2, under 3, over 4, etc. Then starting with strand 2, go over 3, under 4, etc. Continue with the other strands in the same way. Draw the strands as tight as possible. The braiding should be hammered at intervals, to flatten it. Make the buckle tongue as shown in Fig. 8. The strands at the end of the belt are skived thin and then glued between the folds of the tongue after the strap and buckle have been inserted. When the glue is dry holes are punched and the tongue is laced through the strands.



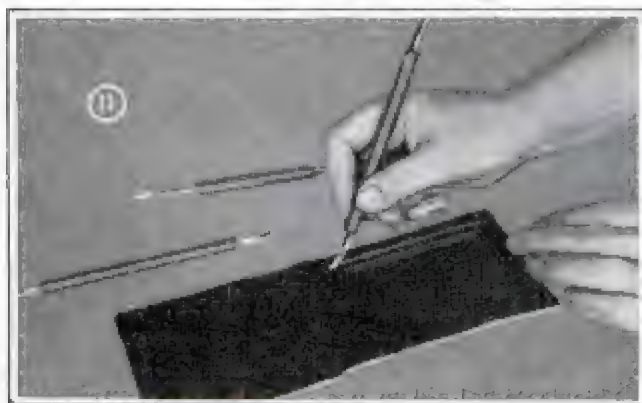
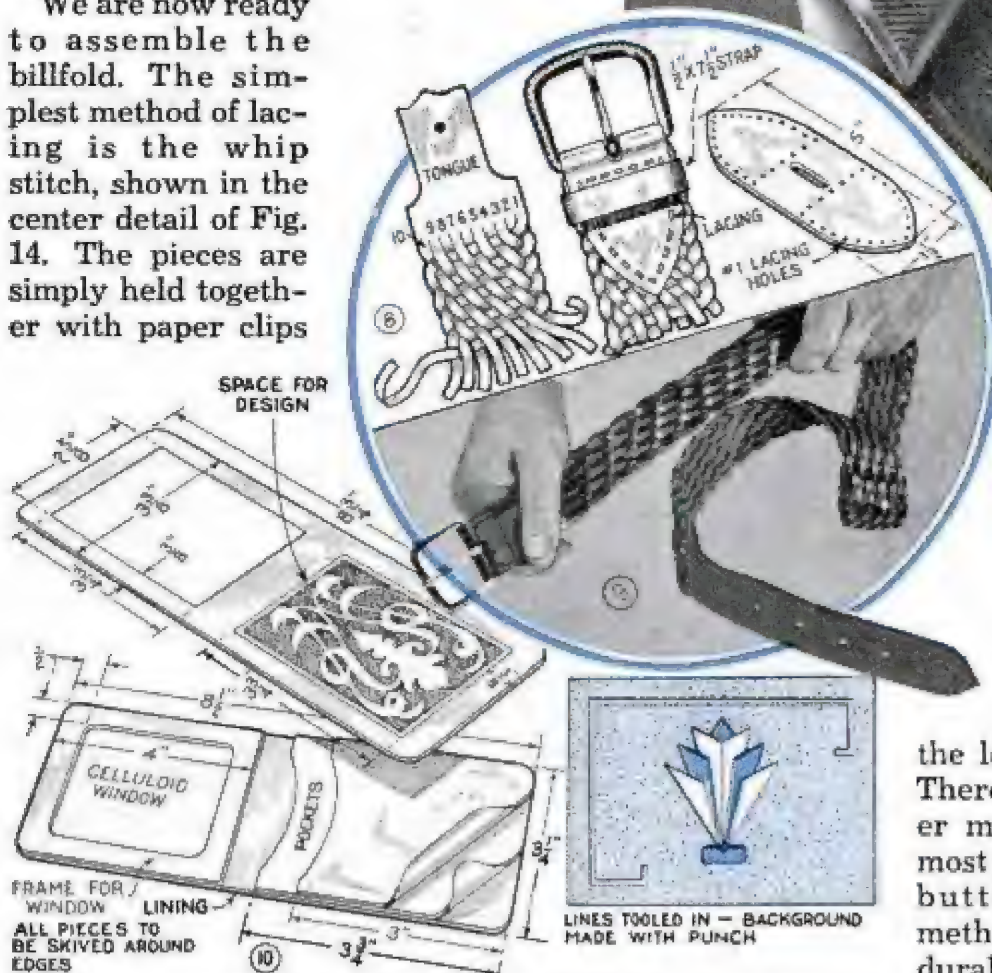
Tooling and embossing designs in leather open up a wide field for craftsmen. An example of this type of work is a billfold, detailed in Fig. 10. A Russian calf or cowhide tooling makes up the cover, lining and two pockets. Only the cover is to be tooled so the choicest piece should be selected for this part. Copy a design on a piece of heavy paper. With a soft sponge dampen the leather thoroughly but not so much that water will ooze out when it is being worked. Lay the piece, smooth side up, on a board and fasten the pattern over it with thumbtacks. Working on the paper pattern, trace the design with the tracing tool, Fig. 1, or a hard pencil. Use a straightedge wherever possible and avoid running past corners by working from the corners toward the center. Marks inadvertently made on the wet leather cannot be removed. Then lift off the pattern, place the leather on a piece of plate glass and retrace the design with a creaser as in Fig. 11. Re-wet and retrace until the lines are of uniform depth. To depress the background, work around the outlines with a





modeling tool or nutpick ground rather flat along the bottom. The final operation is to produce a stippled appearance with a matting tool. If greater relief is desired, the design may be pressed up from the back by laying the piece, face down, in the palm of the hand and working up the raised parts of the design. To secure sharper outlines, the design may be worked out by cutting along the lines with a knife, about half way through the leather, then opening and spreading these cuts with a triangular tool. This type of tooling is called cut leather but requires considerable skill.

We are now ready to assemble the billfold. The simplest method of lacing is the whip stitch, shown in the center detail of Fig. 14. The pieces are simply held together with paper clips



and the holes punched through the entire stack. The two single edges of the paper-money compartment are laced over a single thickness. If it becomes necessary to splice the lacing, simply scarf the ends, glue and clamp as shown in

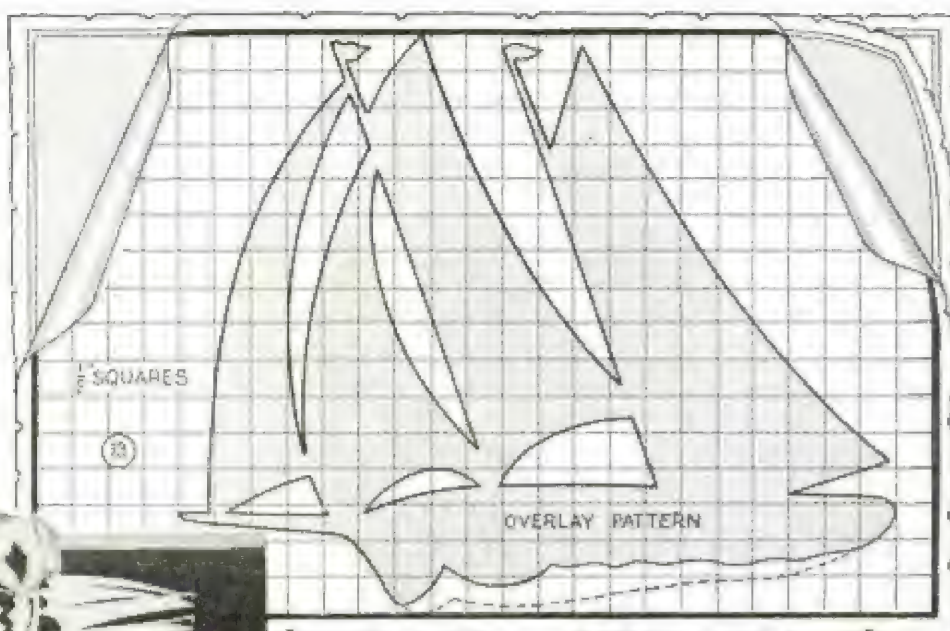
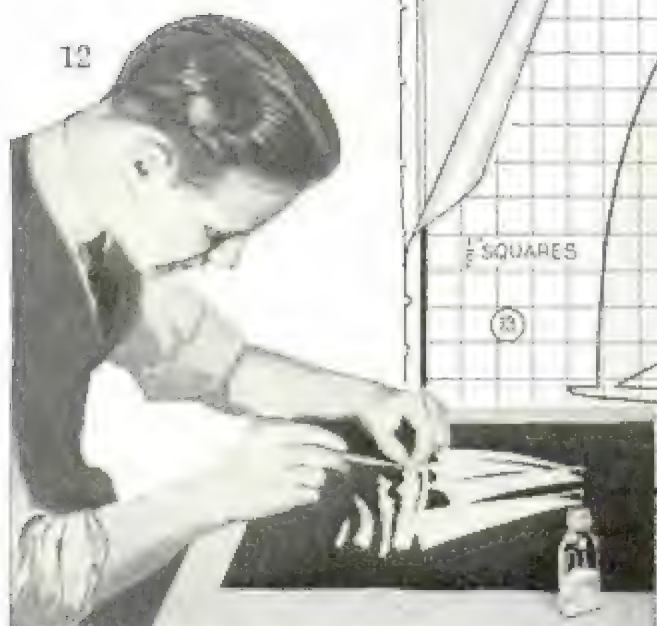
the lower details of Fig. 14. There are a great many other methods of lacing, the most popular of which is the buttonhole stitch. This method produces a more durable edge than the whip

stitch but requires five times as much lacing as the distance around, while the latter only requires two and one half times. The upper details of Fig. 14 show the steps and Fig. 7 shows a billfold laced in this manner. After lacing around, the ends are pulled through two slits, glue is applied and the trimmed end is tucked under the lacing to conceal it.

Staining or dyeing leather work is an ancient art and many beautiful objects



12



have been made in this way. Large areas are colored with a small cloth pad so that the color will be applied evenly. Smaller details may be worked in with a brush as shown in Fig. 2. Water colors, spirit stains and lacquers are all suitable for leather work. Artistic leather work is usually given several coats of wax to protect it from wear and scratching, the wax being applied with a soft cloth.

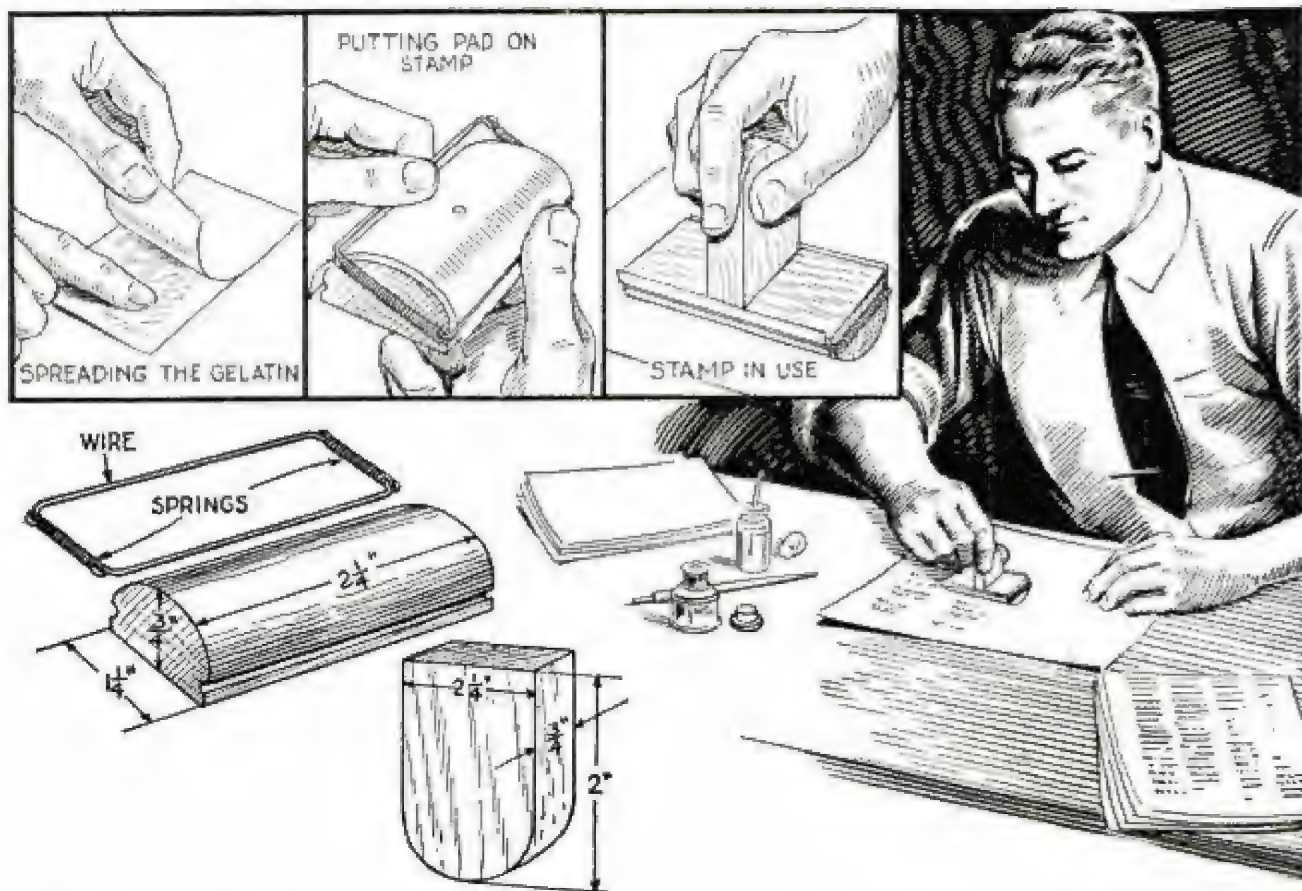
There are different ways of applying the wax effectively, the methods depending on the nature of the surface, whether tooled, stippled or embossed. If the surface is smooth, a cloth for applying and another for polishing will do very well. Where possible the work should be laid on a flat surface so that you can apply sufficient pressure to bring out a high luster. On an irregular surface, however, you have to use a brush in applying and polishing the wax coating. An old toothbrush with soft bristles is just the thing for applying the wax to a tooled or embossed surface. After the wax has dried, use an old hairbrush to polish it. On a raised or embossed surface it will take considerable rubbing with the brush to bring out a satisfactory polish.



Ⓒ In an emergency glossy photo prints can be made by substituting window glass for ferrotype plates. Coating the glass with paraffin dissolved in benzine will prevent sticking of the paper.



# Hand Stamp Has Removable Impression Pads



This small hand stamp will reproduce up to fifty good impressions from one original copy, which may be written, lettered, typed or drawn. It is very useful as a signature stamp or for jobs that do not justify the purchase of a rubber stamp. The stamping surface, which is interchangeable and is held in place by a wire frame with small coil springs in the ends, is a gelatin pad on which a paper with lettering done

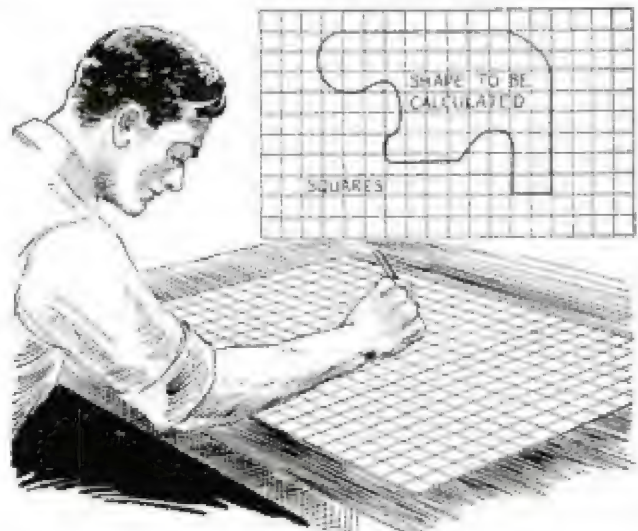
in hectograph ink has been pressed to give an impression. The pads are made by melting hectograph gelatin and spreading it thinly on pieces of paper cut to fit the stamp. The impressions are readily removed from the pads by washing, so that new ones can be made. Thus the stamp can be used for many different purposes without delay or inconvenience.

—M. G. Winterton, Fort Lewis, Wash.

## Area of Irregular Shaped Objects Calculated by Weight

Here's a quick method of computing the area of a small surface having an irregular outline. Trace the outline on a piece of tin marked off in 1-in. squares. Cut out the irregular shape and also one of the squares, after which both pieces are weighed. The ratio of their weight is the same as the ratio of their area.

⌚ Campers who have trouble with pancakes sticking to the skillet may easily overcome the difficulty by scouring the skillet with a handful of ordinary table salt before using it.





## Top Ladder Rung Fits Small Poles to Prevent Slipping



*When this rung is used on a ladder there is no danger of it slipping sideways when set against a pole*

Painters and others who work on poles and pipe standards will find this iron rung an aid in preventing a ladder from slipping. Made of heavy flat iron with a curved piece riveted to the center, the rung is bent at right angles at the ends so that it can be bolted to the sides of the ladder.

—Bob Poulson, Los Angeles, Calif.

## Improved Cribbage Board

Cribbage players who often experience difficulty in knowing whether they are counting up or down the score board, will find that this octagonal one solves the problem, as the counting is done forward and in one direction only. Four players can keep separate scores on the board, which makes it easy to compare the count. To assemble the board, a piece of plywood is cut to an octagon shape, after which the scoring holes are drilled so that each succeeding five are slightly closer to the center than

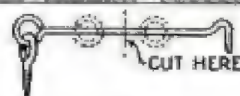
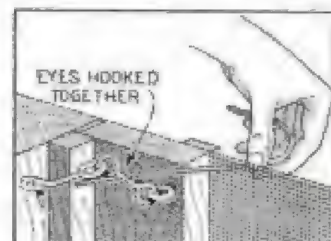


the last five. This gives the spiral effect necessary to get the complete number of holes. Colored lines make it easy to follow the holes, especially if pegs of the same color are used.

—G. B. Rankine, Prospect, Bermuda.

## This Door Hook Is Hard to Pick

If you provide your screen doors with hooks of this type, it is difficult to unlock them by pushing a stiff wire through the screen. Just cut an extra long hook of the regular type in two, form eyes on the severed ends and link them together. Or, use a short hook and make a link from a piece of heavy, stiff wire.



## Washers and Nuts on Holder Are Easy to Remove

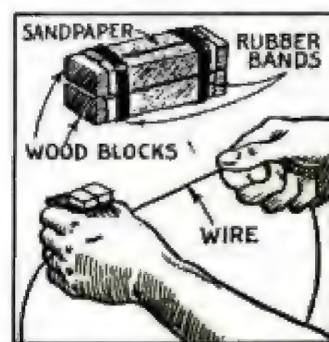


Sorted to size and strung on wire holders of the type shown, washers and nuts are kept in neat order, and when one is wanted it is readily slipped off. The

holders, shaped from spring wire, are kept in a drawer or hung on nails so that you can quickly select the size needed.

## Sandpaper Blocks to Clean Wire

For cleaning and polishing wire, or for removing enamel from it, two small wood blocks wrapped with sandpaper and bound together with rubber bands are ideal for the job. In use, the wire is pulled between the blocks, which are moved back and forth over it as shown.





# MAKING MONEY



*with a*

# HAND LOOM

By  
W. H. BINDER

Hand-loomed fabrics—tapestries, rugs, spreads, etc.—always find a ready and profitable market

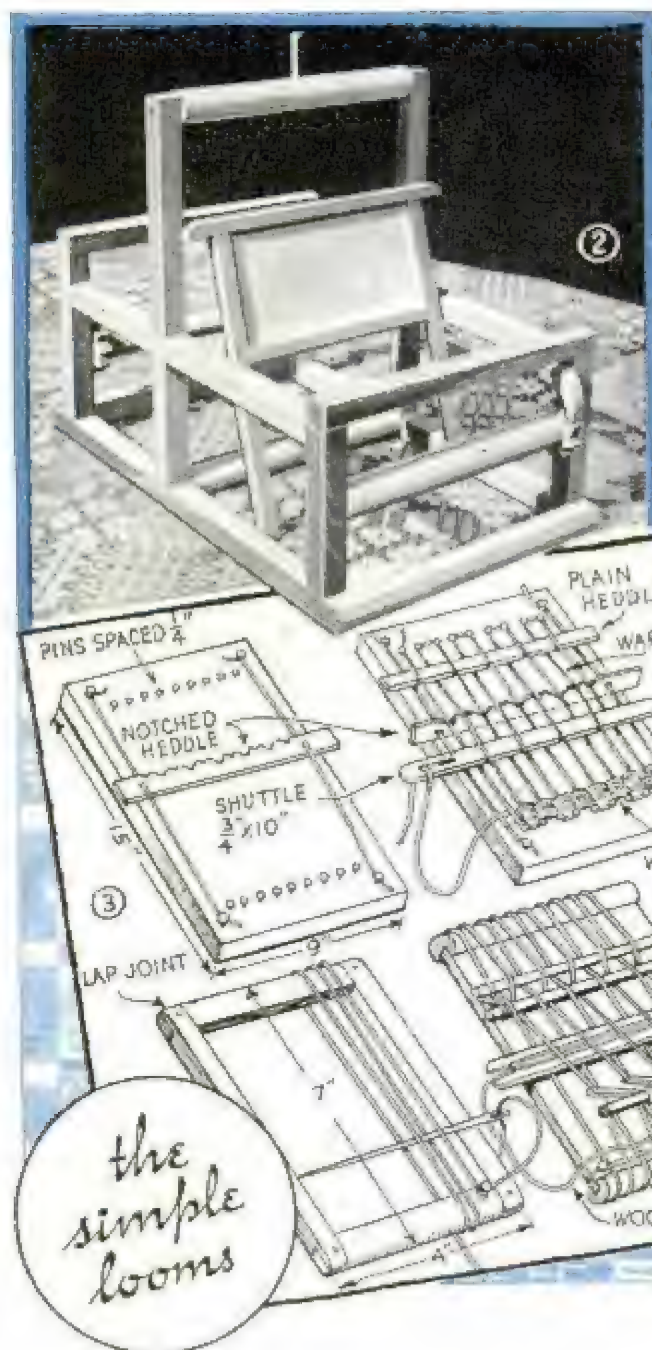
A FEW hours of fascinating work at a hand loom will give you from 10 to 15 yds. of beautiful fabric finished ready for use in your own home or to sell. Materials for the finest work are inexpensive and can be obtained most anywhere.

**Simple Looms:** Of the several types of looms suitable for home work, the simplest consists of a board or frame, Figs. 1 and 3, around which threads are wound evenly, the cross threads woven in with a darning needle or a shuttle, Fig. 4. Although the principle of weaving is the same on all looms, some have more elaborate devices than others to speed up the work. In brief, weaving is simply the process of drawing transverse threads, known as the "woof" or "weft," through alternate lengthwise threads known as the "warp."

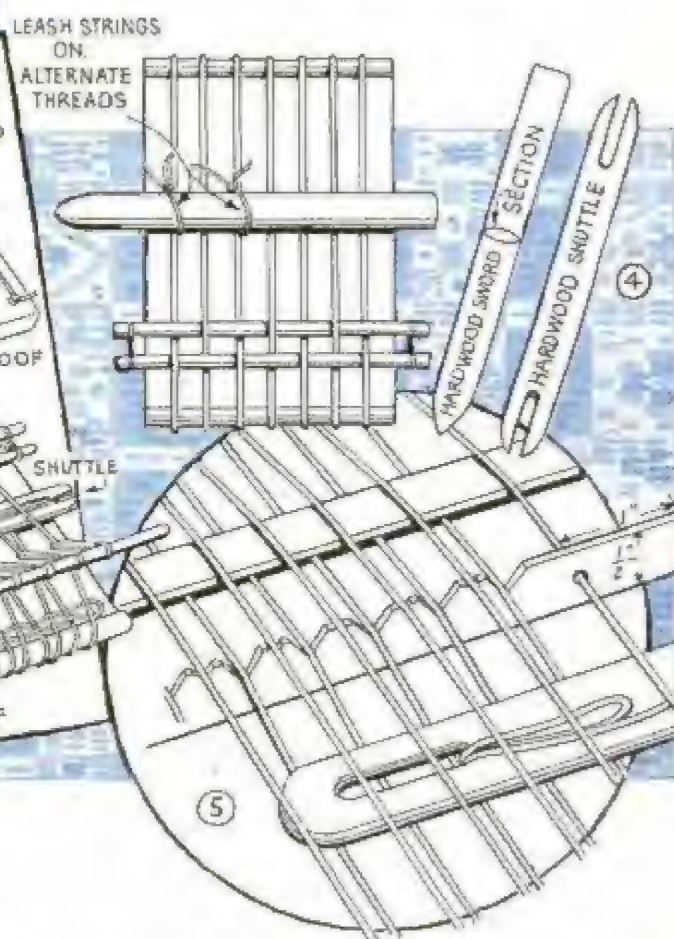
Top details in Fig. 3 show another type of loom made on a flat board. A row of pins near the ends hold the warp, and a







shown spaced much farther apart than in actual practice. The warp is wound on, with two dowels, or lease sticks forming what is known as the "cross." The flat-pointed stick, or "sword" is used in tying strings to alternate warp threads. By tying tightly you assure that all these strings will be of the same length. The loose ends are then tied around a dowel, as in the lower right detail in Fig. 3, the whole thing serving as a heddle harness. Note how one set of warp threads is raised to form a space between through which the shuttle



notched stick, called the heddle, slides on two cords as in the right detail which shows the loom complete with weaving in process and with the plain and notched heddles in position. The heddle, although it varies in form, serves the same function in every loom, that of separating alternate warp threads so that the shuttles can be passed between them. In Fig. 5 you'll see how the small notches of the heddle hold one set of warp threads higher than those in the deeper notches, permitting the shuttle to pass between.

The hand loom shown at the left in Fig. 4, is especially easy to operate, and once threaded, work can be done with reasonable speed. Of course, the threads are

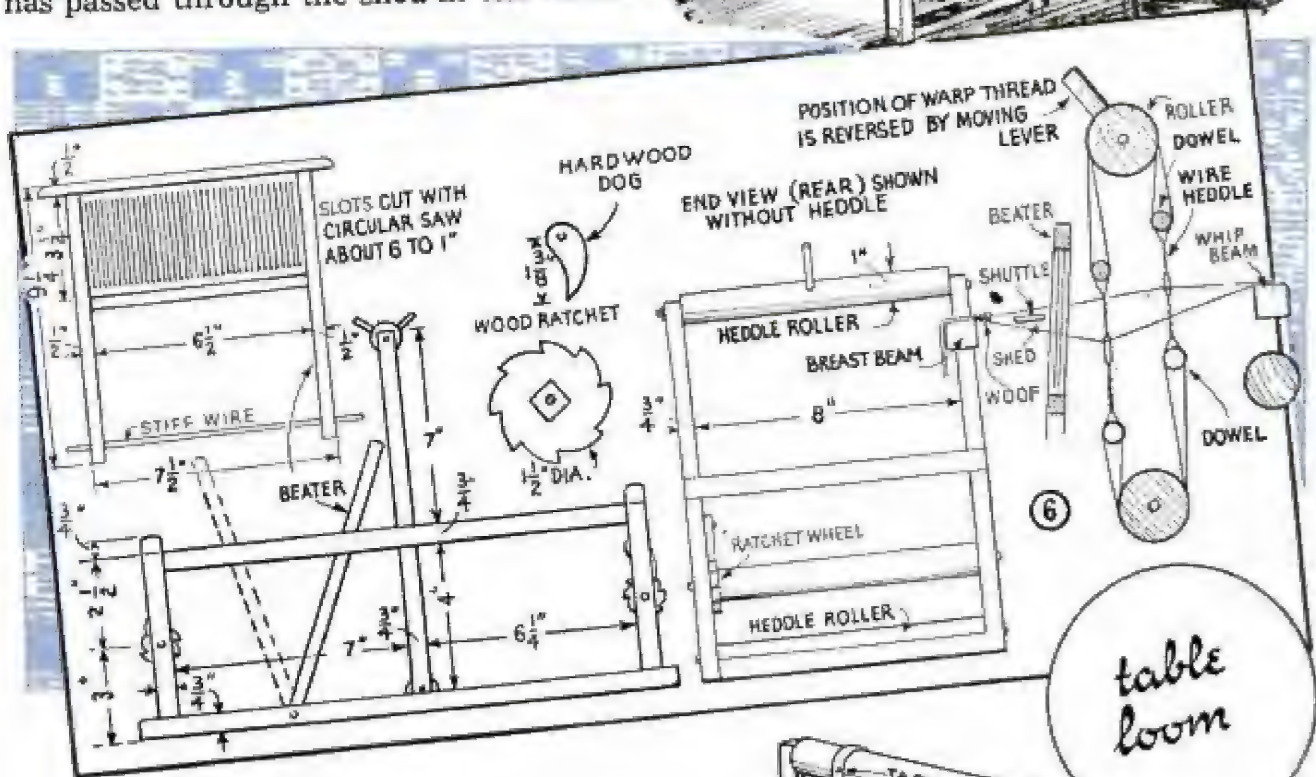
is passed. This space is known as the "shed." The shuttle passes from right to left through the first shed, then the heddle harness is lifted and the shuttle is passed from left to right through the second shed, the process repeating in the same order.

**Table Looms:** The table loom is a somewhat more elaborate affair as you will see from Figs. 2, 6 and 7. It consists of a framework of  $\frac{3}{4}$  by  $\frac{3}{4}$ -in. hardwood with two rollers or beams carrying the heddles, which are moved with a lever as in Fig. 6. Then there is the slotted panel, called the reed, and a frame in which it is installed. The unit is known as the "beater" and is



for the purpose of beating the woof threads tight after the shuttle has passed through the shed.

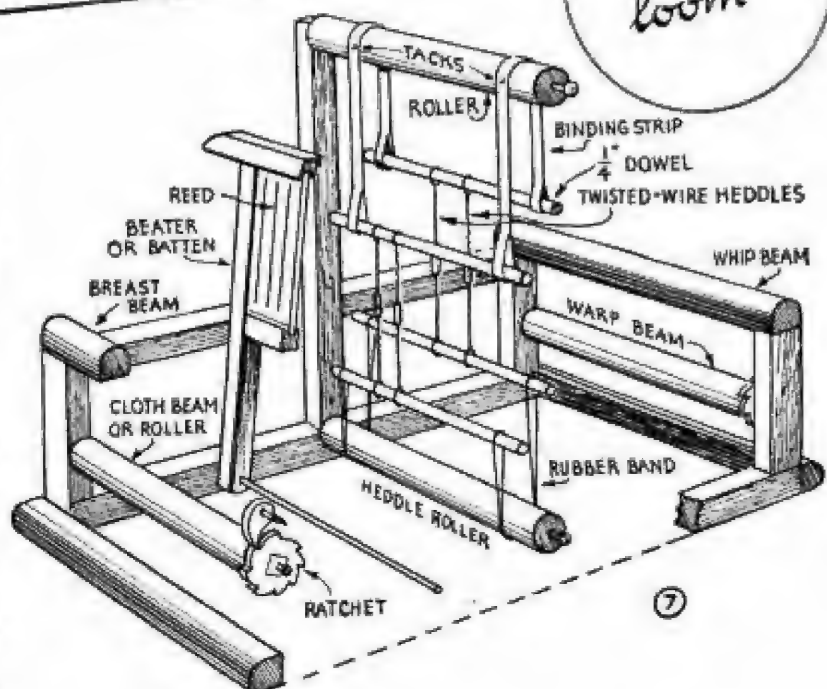
Structural details are shown in Figs. 6 and 7. Rollers with ratchets are provided at each end of the frame, one for winding up the cloth as it is woven, the other to unwind the warp threads. To show the construction more clearly only two wire heddles are shown on each harness, whereas in practice several dozen may be used, depending upon the width of the cloth to be woven and the size of threads. The right-hand detail of Fig. 6 illustrates the action of the heddles. After the shuttle has passed through the shed in one direc-



tion, the beater is pulled forward and returned, the handle on the top roller is moved back to reverse the position of the warp and the shuttle comes back through the shed again.

#### "Four-harness" Loom:

Structurally this loom is essentially the same as that just described, except that it is fitted with four sets of heddles instead of two and is capable of weaving more intricate patterns. It should be kept in mind that hand looms are fitted with as high as sixteen heddles, but these can be



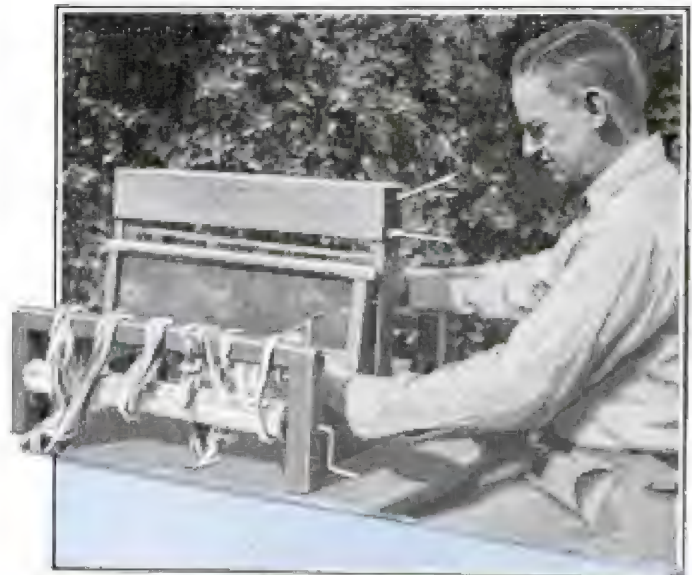
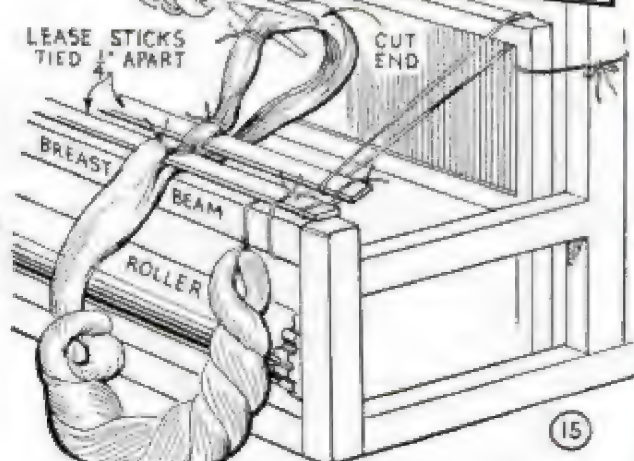
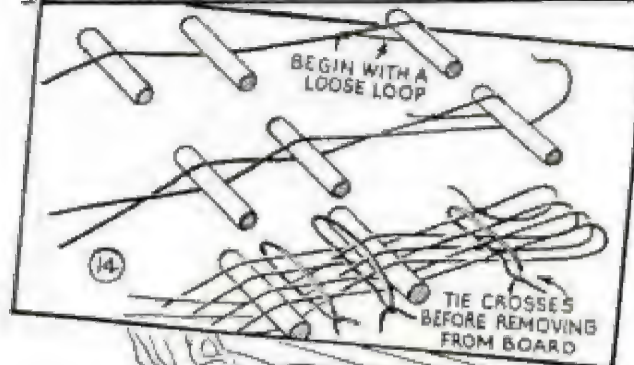
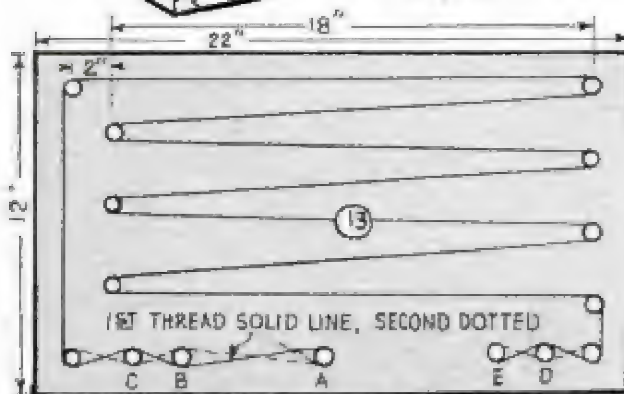
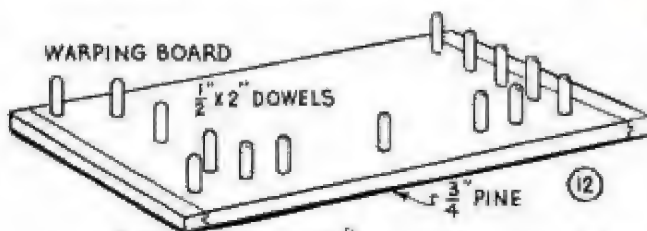






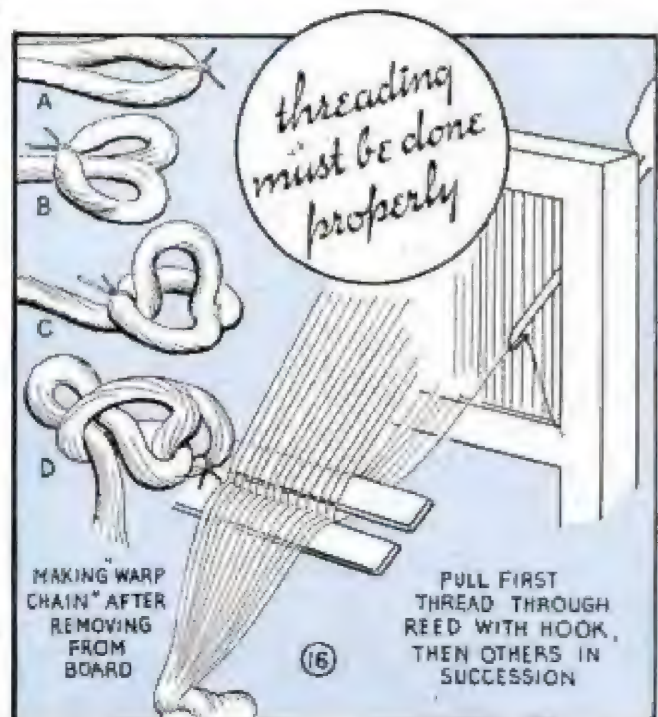
are wound on as the pattern draft calls for. Now tie cords through the crosses, Fig. 14, between C, B and A, as well as E and D, and carefully remove from the warping board. Next, you make what is called a "warp chain." The successive steps are illustrated in Fig. 16, A, B, C, and D. The purpose of this chain is to prevent the threads from becoming entangled before threading on the loom. These chains may be made up from a few to one or two dozen strands, depending upon the pattern, and there will be a number of them for each job.

This done, tie the tail end of the warp



chain to the breast beam of the loom, Fig. 15, and having inserted two lease sticks in the crosses as shown, tie the sticks to the loom in the manner indicated, so that they will remain in place while proceeding with the work. Cut the ends of the threads and with a reed hook inserted in the back of the reed, draw the first thread through the first slot, Fig. 16, the next through the second, and so on, tying every few threads temporarily with a slip knot at the back of the reed as in the upper-left detail in Fig. 19.

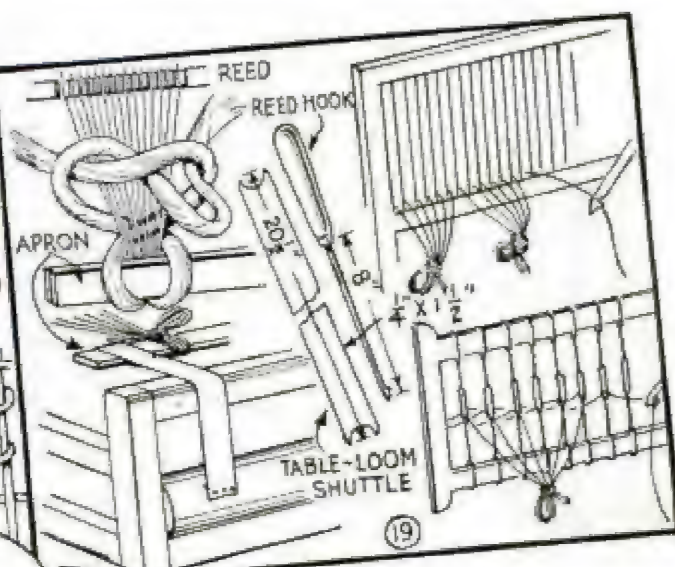
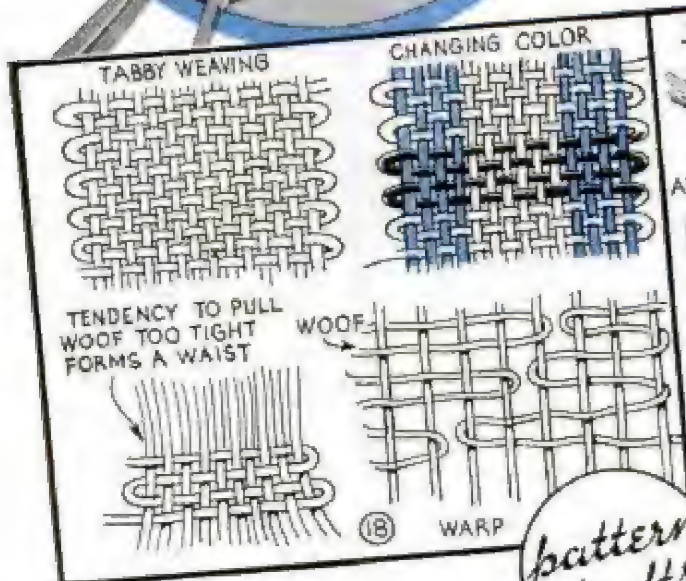
When all are threaded through the reed, start bringing them through the heddles. The pattern draft purchased with your material will indicate which heddle each







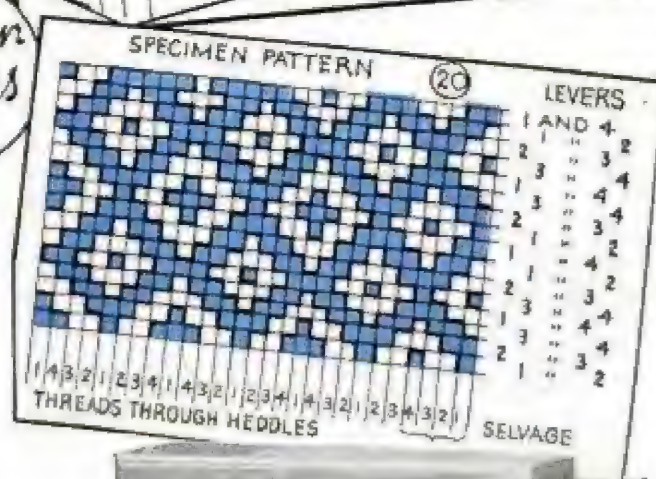
thread which goes between each thread of the woof. At the start of weaving, thin strips of cotton rag can be worked in the same as woof to form a backing to work against, then several strands of thread, which should be sewn criss-cross later, for selvage. Plain or tabby weaving, Fig. 18, is produced by simply passing the shuttle back and forth between movements of the heddles. Of course, to form a pattern you have to change the color of the warp when threading the loom, and then weave in an-



thread is to pass through—whether the first, second, third or fourth. Each eight or so threads—according to pattern—should also be tied back of the heddles temporarily until all are through as in the lower-right detail in Fig. 19. Now tie the ends of each group either to a stick or to a piece of cloth with grommets, called the “apron,” which is attached to the rear roller or warp beam as in Fig. 19. When you start winding, the warp chains at the other end will gradually unwind, through the reed and heddles, and, as they wind on the roller at the rear, sticks are inserted from time to time to keep the strands separated. When all the warp thread is wound, attach the other ends to the front roller, or cloth beam, in the same way they were first attached to the rear. If this has been done properly, the loom is warped ready for weaving.

Two shuttles are required—one for the woof, and the other for binding

*pattern  
drafts*





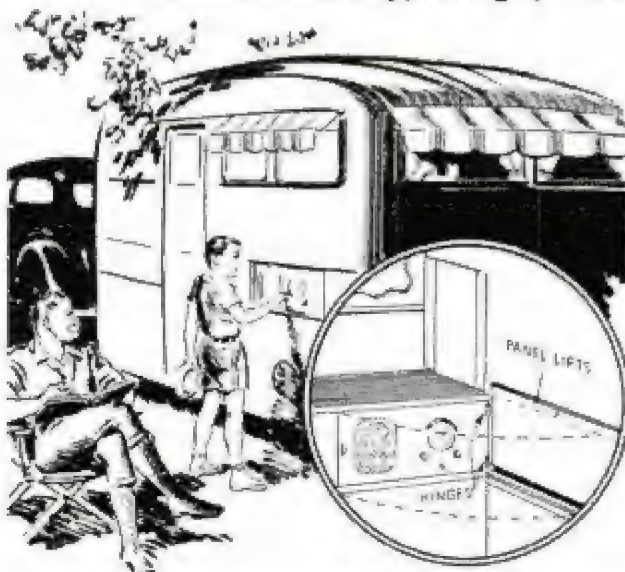
other color of woof to get variations like that shown at the upper right in Fig. 18. If the woof is pulled too tightly, it will form what is known as a "waist," Fig. 18. A bit of practice will easily overcome this tendency, however. In tapestry weaving, woof threads of the same color are not run all the way through, but are looped into the warp in the manner shown at the lower right in Fig. 18, the drawing being purposely exaggerated, of course.

The simplicity of threading and weaving will be seen from the specimen pattern draft in Fig. 20. This appears involved but all you have to do is run the threads through the heddles in the order given by the lower row of figures, and, in weaving, move the levers in the sequence indicated by the figures at the right.

### This Trailer Radio Is Operated from Inside or Outside

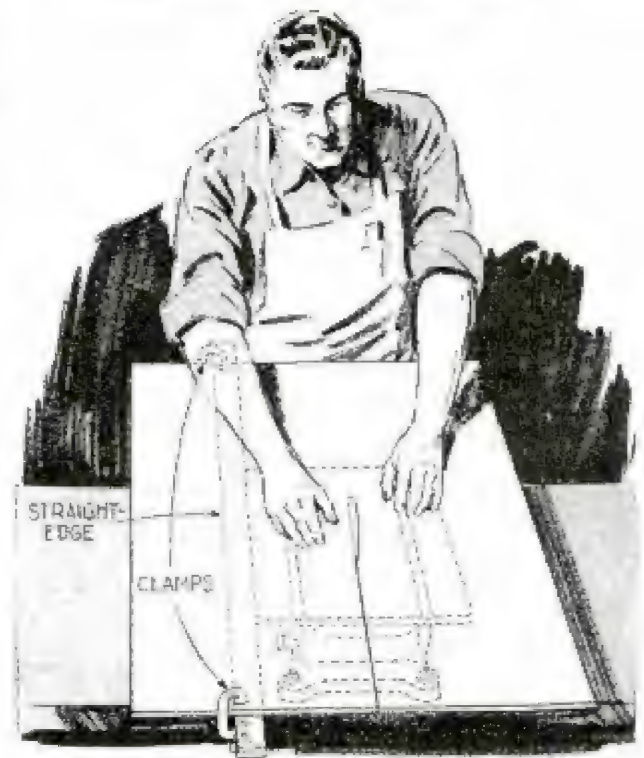
Instead of connecting an extra loud-speaker on a long extension cord to the radio set in a trailer so you can enjoy it outside, it's much easier and better to make the set itself accessible from the outside. To do this without affecting its use inside, you cut a rectangular opening the same size as the radio panel in the trailer wall, and then you hinge the set at one end so that it can be swung in front of the opening. A sliding panel to match the wall keeps the opening closed when traveling.

—Kenneth Murray, Sturgis, Mich.



When this trailer owner wants to listen to the radio outside, he just lifts a panel in the side and swings the radio into it

### Cutting Large Sheets of Plywood on Small Circular Saw



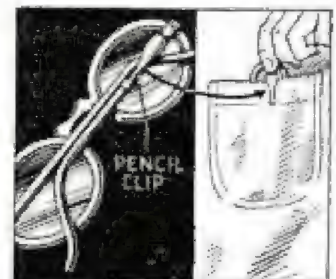
Cutting large sheets of plywood on a circular saw is easy when you use the edge of the table as a guide

To guide a sheet of plywood across a circular saw that has a small table, clamp a straightedge to the underside of the sheet and hold it firmly against the side of the saw table, which then serves as a guide as you make the cut. You can saw the sheet of plywood straight or at any angle by arranging the straightedge accordingly.

—Wayne C. Leckey, Aurora, Ill.

### Sun Glasses Held in Pocket by Pencil Clip

To avoid losing his sun glasses, one man holds them in his pocket with a pencil clip. This is slipped over one of the temples and is pushed up close to the frame where the cylinder part of the clip is squeezed tightly around the temple with a pair of pliers.

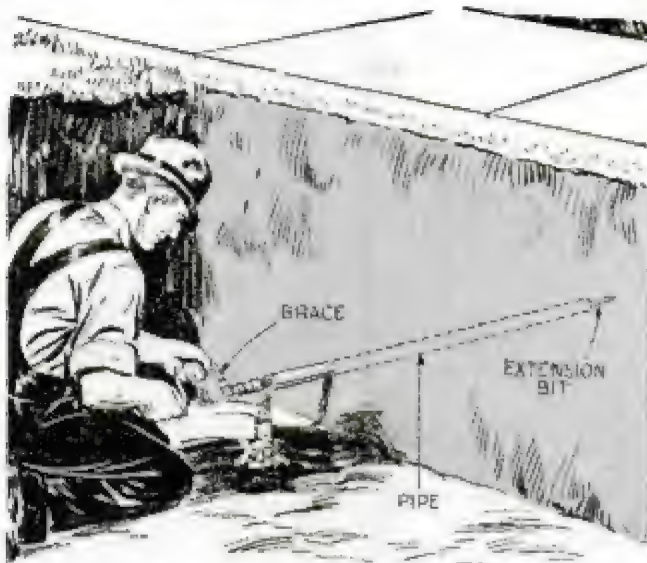


—Lawrence B. Johnson, Spokane, Wash.

☛ To save space in your garbage can, mash all tin cans flat with a hammer.



## Boring Hole under Sidewalk to Lay Pipe



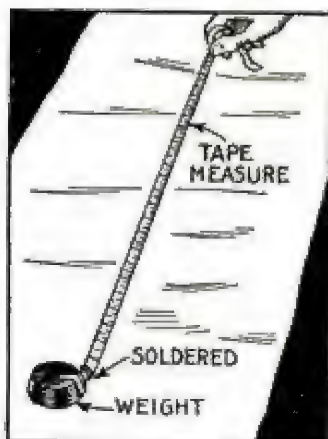
*Easy method of using extension auger to bore hole under sidewalk to install pipe*

When a water pipe must pass under a sidewalk, a good way to make a hole through the soil for the pipe is to use an old extension auger, which is inserted inside a length of pipe slightly larger in diameter than the auger bit. In use, the auger is driven with a brace, the dirt removed being carried back through the pipe. This method, of course, is not practical in stony ground.

## Long-Lasting Lamp Wicks

Ordinary lamp, stove and lantern wicks will last longer than normal if they are saturated with a concentrated aqueous solution of sodium tungstate. After drying the treated wicks, they are ready for use.

## Tape Measure with Weighted End Is Easy to Use



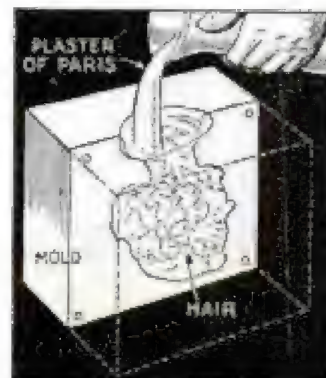
A regular dress-maker's tape measure is easy to use if a small detachable weight is provided at one end, leaving one hand free to mark and cut the cloth. A small piece of lead, babbitt or similar metal can

be cast quickly for the purpose. Or, a weight taken from a discarded platform scale will serve nicely. A wire eye is soldered to the weight for quick attachment of the tape measure.

## Plaster Ornaments Reinforced with Curled Hair

If you like to cast plaster-of-paris ornaments and novelties, you can make them quite resistant to breakage by reinforcing them with curled hair taken from old car cushions.

To use the hair, spread it lightly inside the mold before pouring the plaster. The hair should not be packed. If any of it projects from the finished ornament, it can be cut off.



## Concrete-Block Walls Reinforced with Long Anchor Rods

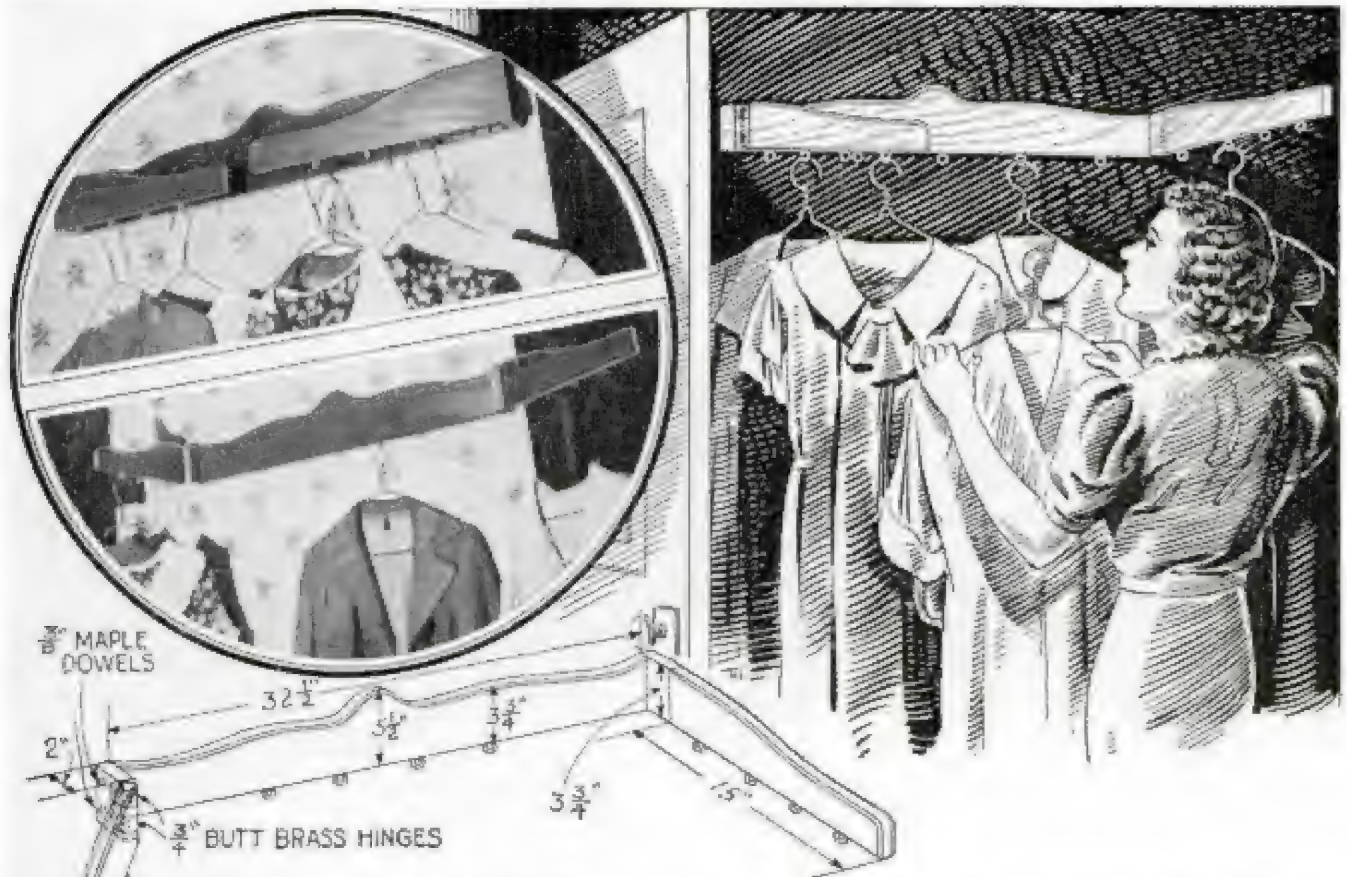
Installed in the footing before a wall of concrete blocks is laid, these reinforcing rods help to keep the wall in alignment. When the wall has been completed, a plate is laid on top and large nuts are driven onto the threaded ends of the rods.



*Long anchor rods hold concrete-block wall in place until mortar between blocks sets*



# This Folding Coat Rack Replaces Hall Tree



If you're tired of a hall tree behind the front door, this compact, folding coat rack will take its place and occupy no floor space. It is spacious, simple to make, and the hinged arms permit it to be folded against the wall even when loaded with garments. Made of three pieces of hardwood, it is held together with brass hinges and dowels. The end blocks

are 2 in. wide and are fastened to the end of the wall piece with two dowels glued in place. The inner ends of the arms are fastened to the blocks with brass hinges and screws. Screw eyes—four to each arm and four along the underside of the wall piece—give twelve places for coat hangers. The wall piece is fastened to the wall with three screws or nails at any desired height.

—Dale R. Van Horn, Lincoln, Nebr.

## Roller on Vise Bar Supports Saw While Setting the Teeth

For supporting a handsaw horizontally while setting the teeth, I equipped the sliding bar of my vise with a simple wooden roller. The roller is mounted on a wooden frame which is slipped on the vise bar and holds the saw in the same plane as the setter, which is clamped between the vise jaws.—Wayne C. Leckey, Aurora, Ill.

☞ A short length of garden hose taken along on a picnic is handy to fill a pail with water from a drinking fountain. Some fountains have an attachment which makes it easy to use the hose. If this is not the case, you will have to hold one end over the mouthpiece.





# CAMERA "GADGETS"



By ALEXANDER MAXWELL

A GRACEFUL swan dive stopped in mid-air, a roaring racer taking a curve on two wheels, a fighting "muskie" making a last stand just out of reach of the gaff—these are pictures that attract attention. Such are real action photos, but they are usually the despair of the amateur photographer. Nevertheless, they can be taken with surprisingly inexpensive equipment.

With the average camera having a shutter operating at  $\frac{1}{50}$  of a second or faster, a lens of f.7.7 or larger, and equipped with the four simple attachments illustrated, you have what it takes to get good action pictures. But to "freeze" swift movement into a permanent film record calls for picture "sense" on the part of the photographer as well. Keep in mind that there are potential speed shots everywhere waiting for the taking. The trick in getting them lies in the ability to appraise the picture possibilities without a moment's delay and being ready to shoot the instant the composition is just right.

To catch fast action you aim the camera at eye level. The subject must be visible not only when in range but long enough before to enable you to draw a "bead" on it. A rifle-sight view finder mounted on

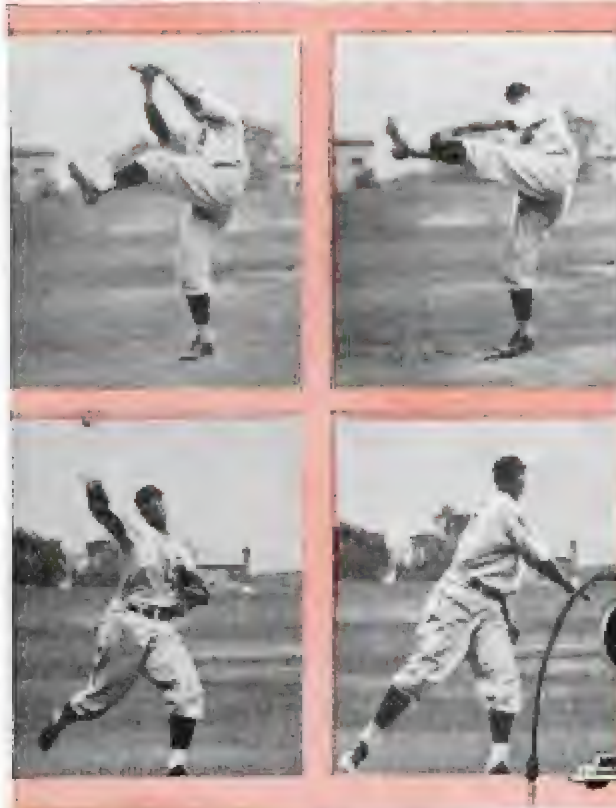
the side of your camera makes this as easy as pointing your finger. The finder consists of a rectangular reducing glass on which are engraved cross lines. Directly behind this is a sight. The image is shown right side up and is very brilliant. To locate the finder correctly on your camera, remove the back and fit a ground glass. Set the focus at infinity and frame a scene about 100 ft. distant. Shift the view finder until the image in it coincides with that on the ground glass. Then focus on an object 10 ft. away and recheck. If located correctly the finder will, in both instances, frame the same scene as that on the ground glass. Usually you can fasten the finder to the camera box with small screws.

Now a folding camera is very difficult to hold at eye level, particularly with one hand. What you need is a form of hand or "pistol" grip and you can easily make one to fit the tripod socket on the camera. Run a No. 20 thread on a short length of  $\frac{1}{4}$ -in. rod and then turn the threaded rod into a hole in the end of a 6-in. length of hardwood broom handle. Shape finger grips in the wood to fit your hand comfortably. Heretofore, focusing a folding



# *that aid in taking*

## **SPEED SHOTS**



camera meant pacing the distance to the object or measuring with a tape line. For speed shots this is "out," as the picture is generally snapped at fairly close range and when the action is near by you can't stop down the lens and get sufficient depth of focus to cancel out the probability of error. One must have a means of assuring exact focus in a matter of seconds. A range finder is the solution to the problem. This accessory varies in price from four to twelve dollars. In use, you look through it and turn the dial until the two images seen blend into one. Read the distance shown in feet on the dial and then set your camera scale to correspond. If the latter scale is accurate, the subject will be in perfect focus. To complete the accessories for work outdoors you will need a lens shade. A short length of mailing tube painted dull black and slipped over the lens barrel will serve very nicely. Supersensitive panchromatic film should be used for speed pictures generally, as it is especially effective at high shutter speeds and will register in light where ordinary film would fail entirely. If you use it in the roll form be sure to read the manufacturer's direc-



*These four fittings  
needed for folding cameras*





25°  
60 M.P.H.,  $\frac{1}{100}$  SEC.  
30 M.P.H.,  $\frac{1}{50}$  SEC.  
15 M.P.H.,  $\frac{1}{25}$  SEC.



30°  
60 M.P.H.,  $\frac{1}{200}$  SEC.  
30 M.P.H.,  $\frac{1}{100}$  SEC.  
15 M.P.H.,  $\frac{1}{25}$  SEC.



45°  
60 M.P.H.,  $\frac{1}{300}$  SEC.  
30 M.P.H.,  $\frac{1}{200}$  SEC.  
15 M.P.H.,  $\frac{1}{50}$  SEC.



70°  
60 M.P.H.,  $\frac{1}{1000}$  SEC.  
30 M.P.H.,  $\frac{1}{500}$  SEC.  
15 M.P.H.,  $\frac{1}{200}$  SEC.



90°  
60 M.P.H.,  $\frac{1}{2000}$  SEC.  
30 M.P.H.,  $\frac{1}{1000}$  SEC.  
15 M.P.H.,  $\frac{1}{250}$  SEC.

tions for loading it in the camera.

Judging the picture value presented by a given set of conditions or actors, and the time to snap the scene, is up to you. When you're sizing up the possibilities, make it a habit to look through the finder with both eyes open. In this way you get a truer perspective and can see what is going on about you as well as keeping the subject covered. Whether your camera is equipped with a lever or cable shutter release, it should be operated with a velvet touch. When the time is right, take up the slack in the cable or lever, hold your breath and release with a gentle pressure. Many good pictures have been spoiled by jerky operation of the shutter. Before one tries the really difficult shots it's a good idea to practice on moving objects which have a fairly uniform rate of motion. Fast trains may not interest you especially but they are spectacular performers before the camera. A train traveling a mile a minute moves 88 ft. per second. In the fraction of a second it takes the shutter of an ordinary box camera to operate, the train will have advanced approximately 2 ft., resulting in a blurred, meaningless negative. But by choosing the correct angle the swift motion of the train can be stopped, as you will see from the accompanying chart, which gives a fairly accurate table of angles and the position at which one may expect a sharp picture at a given shutter speed. Note how the exposure time shortens as the angle of view

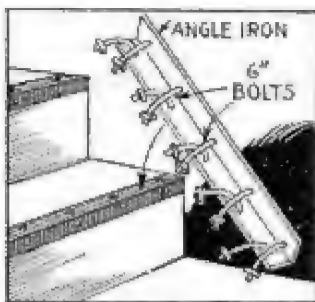
BOX-CAMERA STOPS  
ALL ACTION AT ANG-  
LES LESS THAN 25°

CAMERA



increases to very nearly broadside. When you can stop the train in the center of the picture every time, you are ready to practice a trick employed by skilled photographers at race tracks, that of taking a speeding object broadside. This is possible at short range only with a shutter having a speed of  $\frac{1}{1000}$  of a second or better, but at 300 ft. an ordinary box camera can do it. Catch the object in the view finder while still some distance away and, as it rushes past, swing with it to synchronize the motion and simultaneously snap the shutter. The result will be the object standing out against a blurred and streaked background. Another trick in getting a similar picture is taking a shot of a sprinter jumping a hurdle. Focus the range finder on the top bar of the hurdle, keeping in mind that to be effective such a picture should be taken at a comparatively short distance. Focus the camera and when the runner is poised in mid-air, snap the picture. The result will show the man and hurdle in sharp relief against a blurred and "fuzzy" background, the reason being that the latter is out of focus. Technically, such pictures are considered good because they concentrate attention on the subject.

### Edges of Concrete Steps Protected by Lengths of Angle Iron

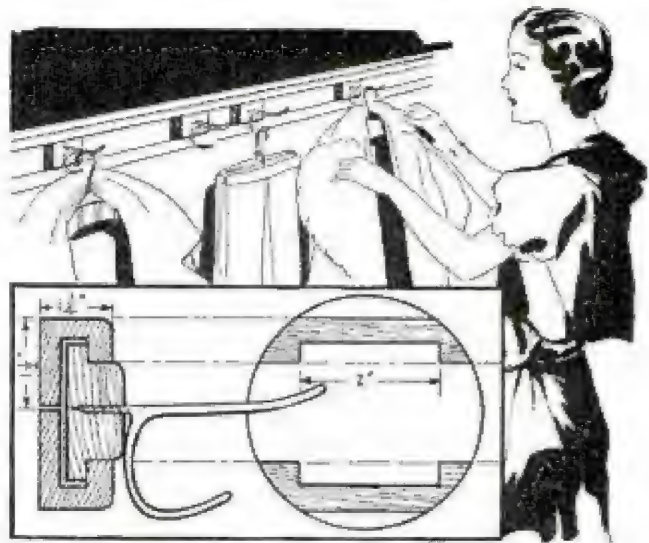


When building concrete steps, it's easy to install angle-iron edges on the steps to protect them against chipping or cracking. Drill several holes in each piece

of iron to take flat-head bolts, which are fitted with nuts and then bent so that the ends will extend into the concrete when it is poured. Set the irons right in the form, pour the concrete and then trowel it down smooth and flush with the edges of the irons. When the forms are removed, the irons will be imbedded firmly in the edges of the steps.

☛ Curled photo prints can be rolled in a window shade to straighten them.

### Coat-Hook Strip in Your Closet Adjusted to Suit Garments

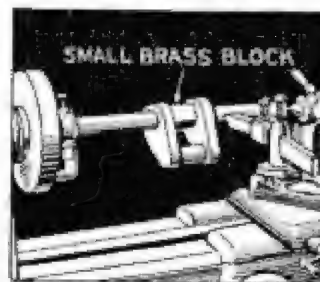


*With this coat-hook strip, you can space your garments along the wall as desired by sliding the hooks*

Put this coat-hook strip on the wall of your clothes closet and you'll never have trouble of large garments overlapping the smaller ones, as the hooks can be spaced to suit by merely sliding them along in a channeled strip. Easily cut on your circular saw, the channeled strip consists of two pieces of hardwood dadoed as indicated to take sliding blocks which carry the coat hooks. To avoid splitting and insure durability, it is best to cut the blocks from heavy plywood.

### Turning Model Crankshafts

Here's a method of making a crankshaft for a model that will enable you to finish it right in the lathe without it springing or whipping badly. First, rough turn it to



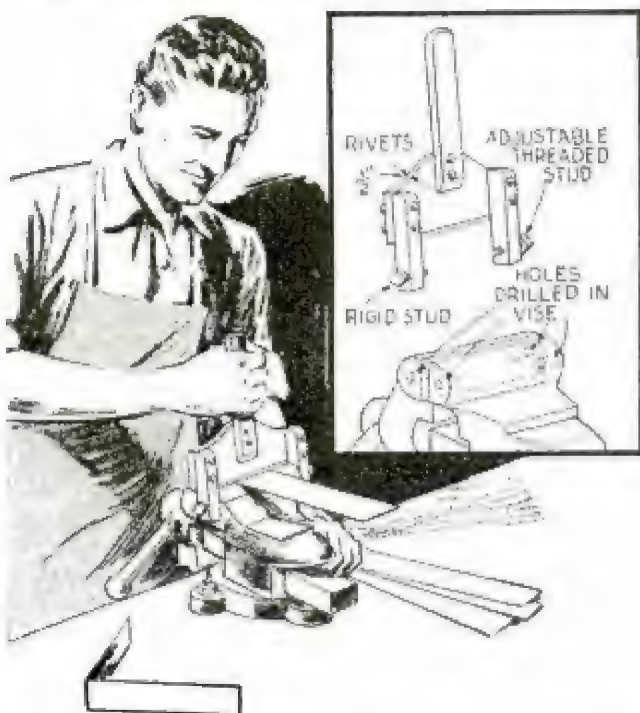
shape and finish the crank webs and the connecting-rod journal. Then solder a small brass block between the webs as shown. This stiffens the webs and journal so that

the crank can be completed easily. When the crankshaft has been finished, heat it to melt the solder and then knock out the brass block, cleaning up the webs with a brush while the solder is still molten.

—Chas. B. Kramer, Michigan City, Ind.



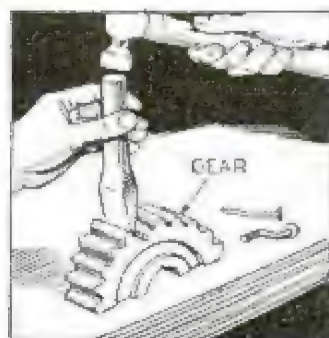
## Bench Vise Converted to Brake by Using This Bending Fork



*By fitting your bench vise with this bending fork, you can shape light metal quickly and accurately*

Made from iron as indicated in the detail, this bending fork converts your bench vise to a brake for shaping sheet metal. One leg of the fork is fitted with a fixed stud or steel pin, and the other leg is drilled and tapped for a stud which can be screwed in or out for attachment to your bench vise. One or both jaws of the latter are drilled at the ends to take the studs. If the depth of the holes is not greater than  $\frac{1}{2}$  in., drilling the jaws will not weaken them.—F. F. Crooke, Jefferson City, Tenn.

## Nail Straightener from Old Gear Has Many Uses



You'll find several uses for half of an old gear around the workbench. When squared so that it will set on an anvil or bench, it's handy for straightening bolts, nails,

cotter keys, and can even be used in corrugating strips of sheet metal. In use, the article to be straightened is laid between two teeth, after which an old cold chisel,

rounded on the flattened end to fit between the teeth, is placed on the article and struck a sharp blow with a hammer.

—A. H. Waychoff, Tempe, Ariz.

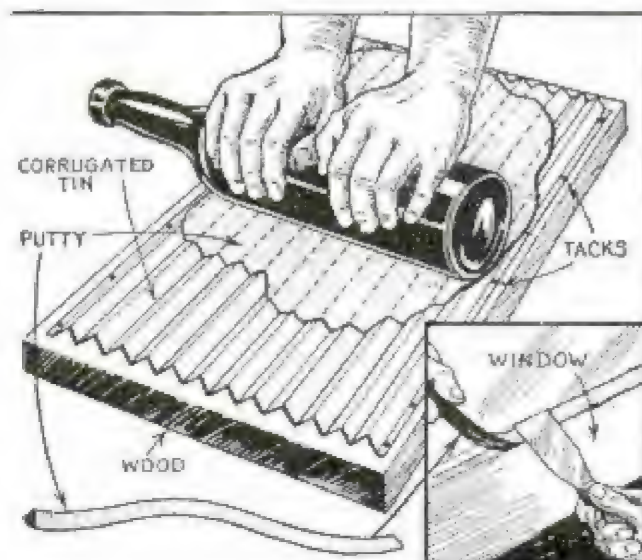
## Washing Powder Removes Stains

Many stubborn stains that are slightly affected by ordinary washing with soap and water can be removed by adding the following cleaning powder to the wash water. Sodium perborate, 3 oz., borax, 4 oz., and trisodium phosphate, 5 oz. The powder is added in small quantities to the soapy water. A liquid cleaner which performs the same service is made by mixing sodium perborate, 5 oz., soda ash, 5 oz., water glass, 2 fl. oz., and water, 1 gal. To this solution is added sufficient soap chips to produce a good lather when the liquid is added to the wash water. The liquid cleaner will not retain its full strength for long, therefore, it should be made up as required for best results.

## Putty Cut into V-Shaped Strips Is Easy to Apply

By corrugating a sheet of tin and tacking it to a board, one may roll putty over it into convenient strips for use in glazing window sash. A bottle is used to roll the putty, and the strips, being of the size and shape to fit against the sash, will smooth easily into place when a putty knife is applied in the usual way.

—G. E. Hendrickson, Argyle, Wis.



*The amateur glazier can do a neat job if the putty is shaped into V-strips on this special "board"*



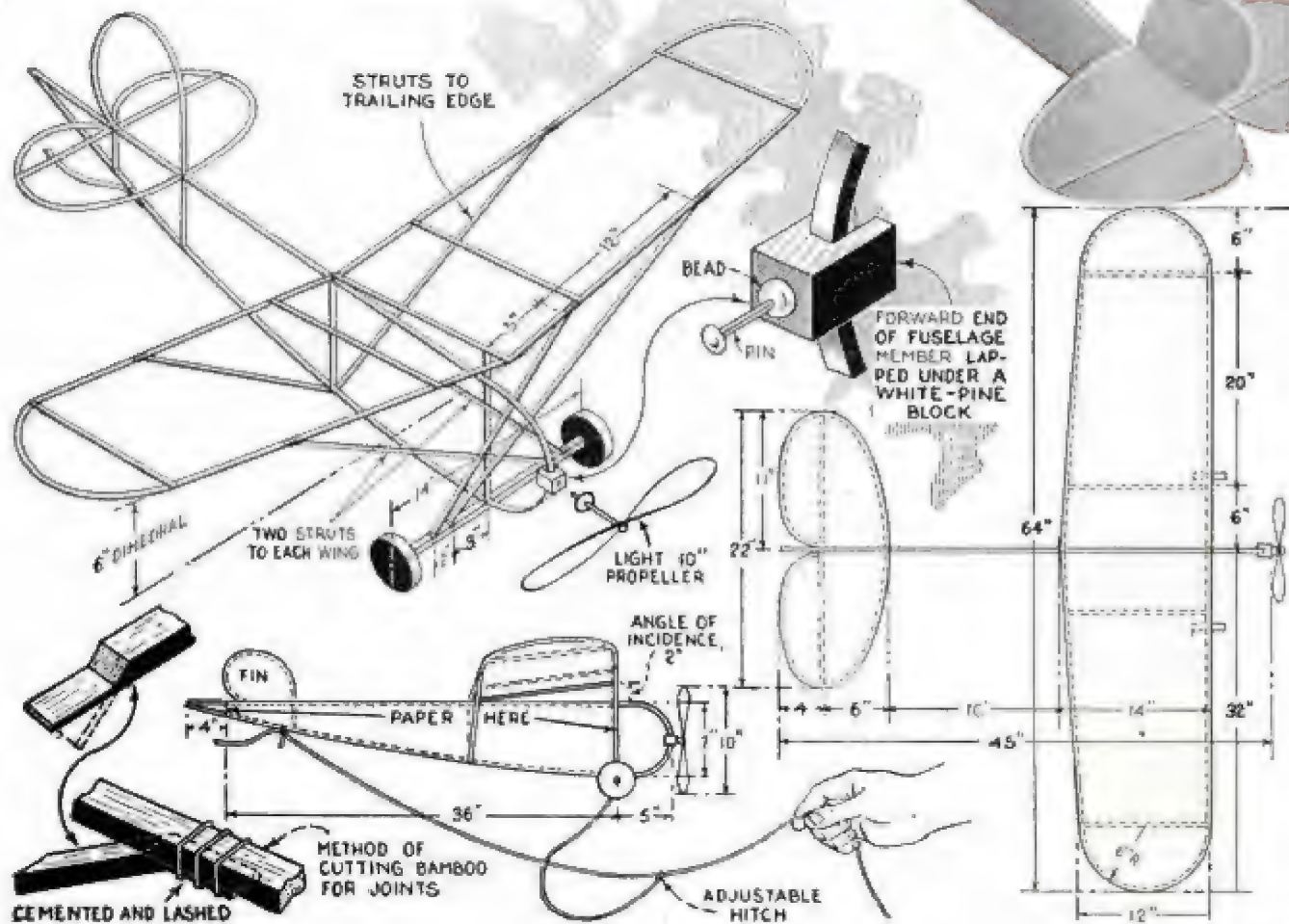
# "Airplane" KITE

*tests air currents at model meets*

**Knowledge of the velocity and action of the wind, which can often be obtained by using this kite, has saved many a model airplane from destruction. The kite is extremely sensitive and will record every puff by a jerk on the string. Made of 1/16 by 3/16-in. bamboo strips, the various parts are assembled by lapping the joints, which are cemented and lashed together with thread. A simple method of making a joint is to cut away a portion of the end of the frame member, leaving a thin strip which can be bent over, cemented and lashed to the adjoining member. Lengths of cord from the tail skid and the axle permit considerable latitude in adjusting the main string**

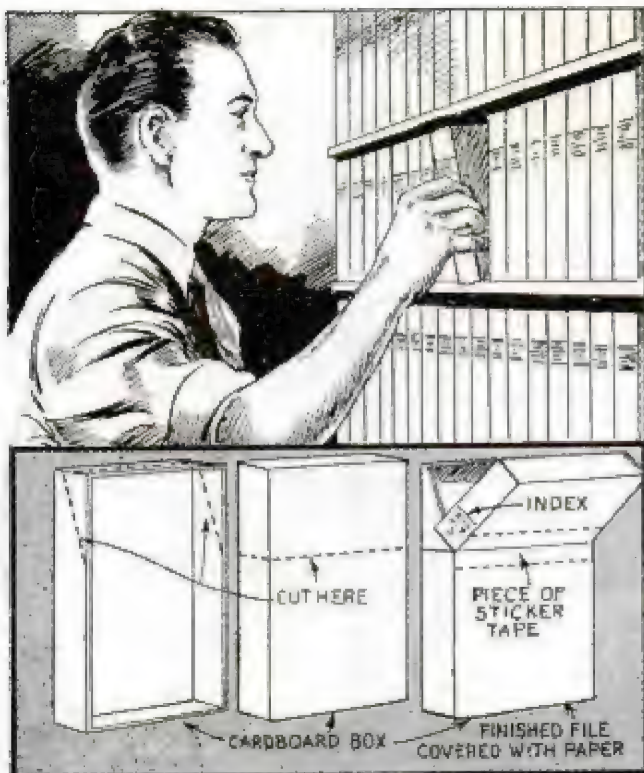


ALL FRAMING BAMBOO  
COVERED WITH RICE  
PAPER





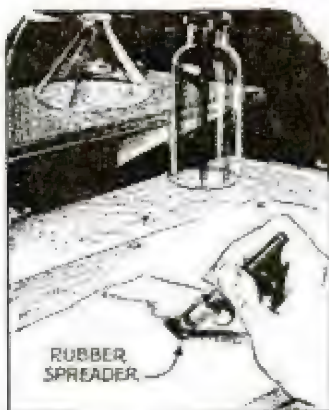
## File Boxes Made from Cardboard Stored on Shelves



*If you lack file-cabinet space, make a few of these file boxes and store them on wall shelves*

Photographers and others who have considerable material to keep in files but lack sufficient cabinet space, can make up a number of these files from cardboard boxes and store them on shelves where the contents will be kept in order and out of the dust. To make the files, one end of each box is tapered down almost to the bottom, after which the sides of the lid are cut at this point so that the end can be folded back. A strip of adhesive tape placed over the lid where it bends tends to strengthen it.

## Glue Spreader Used by Chemist for "Rubber Policemen"



Amateur chemists who use small rubber paddles known as "Rubber Policemen" for scraping and collecting precipitates from filter paper, beakers, etc., will find that glue spreaders,

available in dime stores, serve the same purpose. The spreaders, which come with a bottle of glue costing ten cents, are available in any locality, while the "Policemen" are usually available only in lots of a dozen from chemical supply houses.

## Electric Fan Easily Carried by Leather Handle

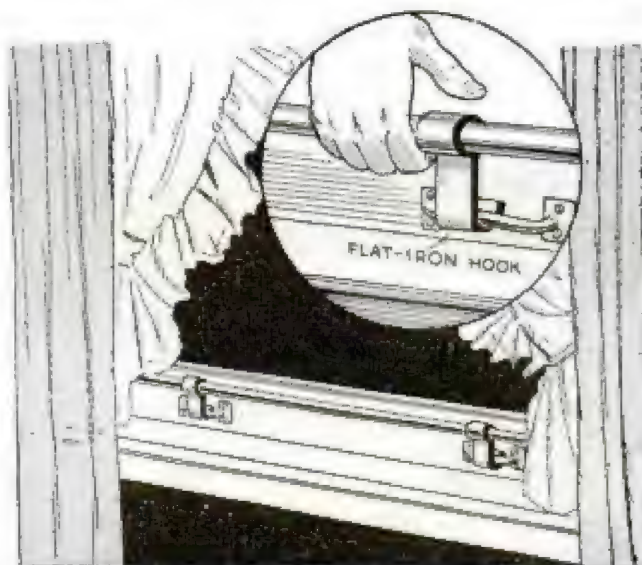
It's a good idea to provide the small electric fans used around the home with leather carrying handles, which will enable you to move them from place to place easily with little possibility of dropping them. The handles are lengths of leather having the ends



folded over the guards as shown and riveted.—Opie Read, Jr., Chicago.

## Window Opener Provides Grip to Exert Strong Pull

This opener, which hooks over the handles on a window sash, enables you to get a



*Sticking window sash that cannot be opened by pulling up on the handles usually respond to this opener*

good grip with both hands so that a strong pull can be exerted to open windows when they stick. It has been found especially



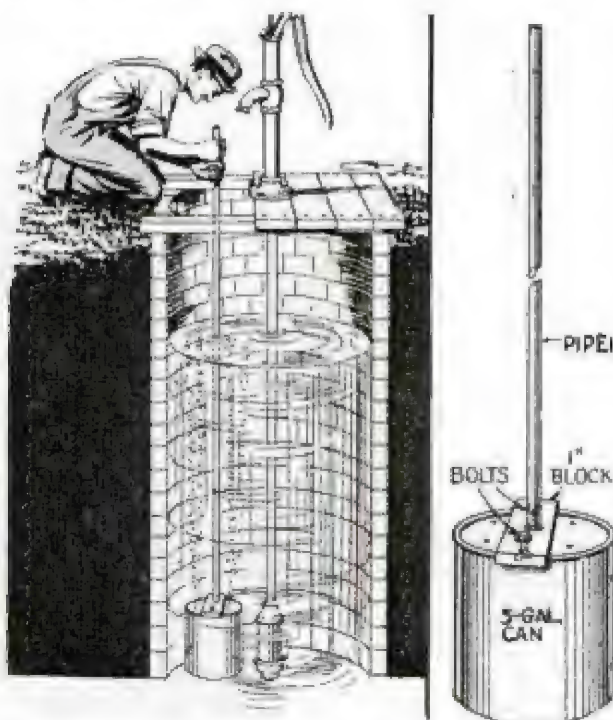
useful for janitors of apartment buildings. A piece of pipe is fitted with two flat-iron hooks, bent to a sliding fit on the pipe so that they can be adjusted to engage window-sash handles of different spacing.

### Preparing Minnows for Bait

While experimenting with different types of bait for fishing, one sportsman discovered that live minnows painted with mercurochrome were attractive to fish, especially bass. The minnows are painted from below the gills to the tips of their tails.—James Vick, Church Road, Va.

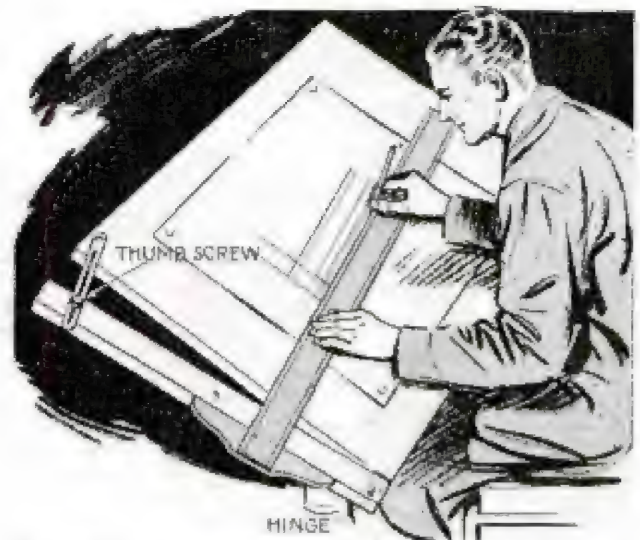
### Aerating Stale Cistern Water

If the water in your cistern becomes stagnant and has a bad odor, usually the trouble can be eliminated by aerating it. This is done easily with a 5-gal. can fastened to a long handle. The can has one end removed and four or five holes drilled through the other. A block is fastened across the closed end of the can with bolts, and the handle, which is a length of pipe, is attached to the block with a floor flange. Repeatedly raising the can out of the water and then pushing it to the bottom will do the job. In this way, air trapped in the can is slowly released as the can is pushed through the water.



*You can keep water in a cistern fresh and pure by aerating it with this simple device*

### Hinged Edge on Drawing Board to Rule Slanting Lines



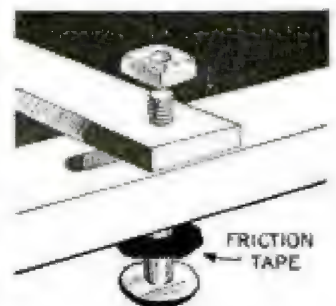
*Adjustable edge on drawing board permits T-square to be set at almost any angle desired*

As an aid in ruling lines at various angles outside of the range of triangles, one designer hinged a narrow strip of wood to one edge of his drawing board and fitted it with an adjustable arm. The T-square is used in the regular manner after the strip has been set to the angle desired. The arrangement is especially useful for cross-hatching and slant lettering.

### Friction Tape Holds Bolt to Tighten Nut

After spending some time trying to tighten a nut on a round-head bolt, which I was unable to keep from turning, a washer was cut from friction tape and slipped under the head. When the bolt head was held firmly against the tacky surface of the tape, the nut was easily drawn up tightly.

—J. Lee Doss, Palm Springs, Calif.



When photographing cut glass, silverware, etc., halation generally can be prevented by coating the object with milk. Large objects that cannot be dipped readily should be coated with a brush. Allow the milk to dry before taking the photo.



# EASY SOLUTIONS *for you*



*Left, while you won't find this idea any help when sealing jars of homemade jelly with paraffin, some months later when you open them it will prove itself a real timesaver. Simply place a piece of string across the top of the glass when you pour the paraffin and the seal can be removed later on without any fuss or bother*

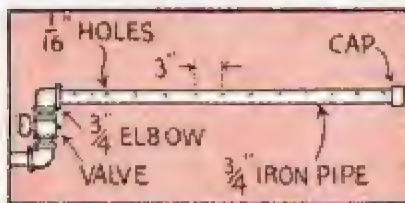


*To prevent snarling of thread and to avoid the unsatisfactory knife cut in the flange of the spool, simply bend a paper clip as shown above and force it into the center hole. The clip turns as the thread is unwound from the spool. Upper right, there's no need to lift steaming clothes from a boiler and have the hot water run down the clothes stick and burn your hands. Simply cut the stick with an offset handle as shown and the water will drain back into the boiler, leaving the handle dry. Right, when you want a fruit juicer in a hurry, at a picnic, for instance, take a tin can and make two separate semi-circular cuts in one end with a can opener. No need to be careful about it as you want rough, irregular edges. Then bend the two halves up to a vertical position as shown*





# HOME PROBLEMS

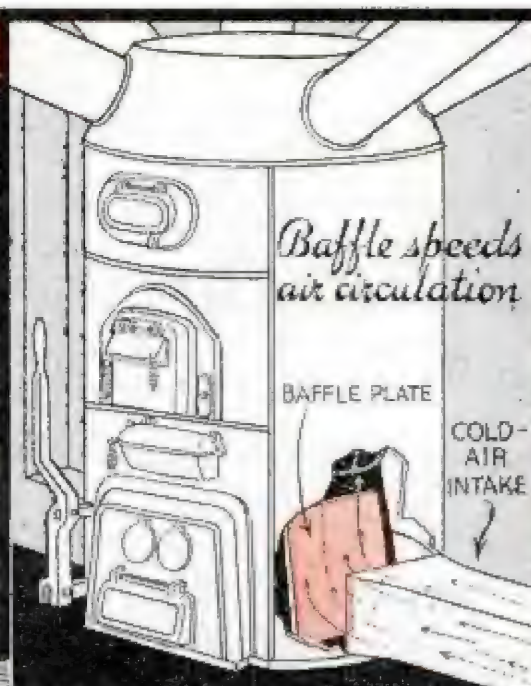


With this gas fixture installed as shown at the left you can start the log fire any time without having to chop kindling. The detail gives you sizes of pipe to be used

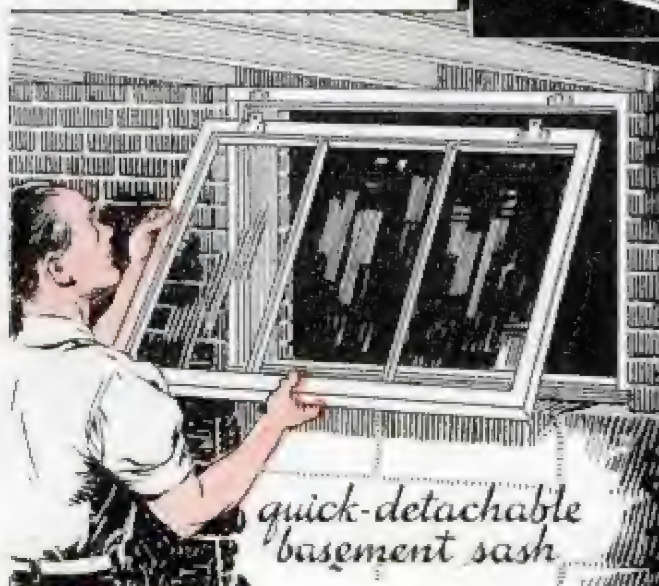


Baffle speeds air circulation

BAFFLE PLATE  
COLD-AIR INTAKE



Right, in ordinary hot-air heating installations, cold air flowing into the furnace encounters heat reflected from the hot walls of the ash pit, resulting in an "eddy" which slows down the air movement. By installing a fireproof baffle in front of each cold-air return and about 3 in. from the base casting, the cold air will be deflected upward to mix with the heated air above, thus greatly increasing the efficiency of the system



Upper right, you can save your patience and avoid the possibility of a serious accident by using this vacuum-cup arrangement for replacing light bulbs in high places. Simply attach a vacuum cup to one end of a stick, then push the cup against the bottom of the bulb, unscrew it, set the renewal bulb into the cup and screw it into the socket. The job is done in a few seconds. Left, it's handy to have basement windows that you can remove easily for cleaning, replacement of broken glass, or painting. To make the windows quickly detachable you substitute ordinary screen hangers for the usual butt hinges. A sash lock makes a good catch, as it closes the window tightly



## Thumbtack Strips Save Time for Artists and Designers



*Thumbtacks soldered to metal strip are quickly removed from drawing and tend to protect it*

Artists who make drawings on several sheets of paper of the same size will find

many uses for metal strips with thumbtacks evenly spaced and soldered to them. The strips not only permit the drawing to be fastened or removed quickly, but they also tend to prevent accidental tearing of the drawing with a triangle or T-square, especially when using thin tracing paper.

## End of Small Spring Anchored by Dressmaker's Hook

When constructing a model or other object on which it is necessary to use a small coil spring, a dressmaker's hook provides a dandy fastener for attaching the eye of the spring. The hook has a spring retaining tongue, which tends to keep the eye of the spring in place.

—F. W. Bentley, Jr., Missouri Valley, Ia.



# What Kind of Boat Do You Want?

Whether it's a simple rowboat, an outboard runabout or a family cruiser, you'll find something you want among our blueprints. These are some of the popular prints in the list:



21-Ft. Sloop "Arrowhead"—944 to 951

**"ARROWHEAD" SLOOP**—944 to 951: 21-ft. sailboat that can be built by average craftsman. Accommodates up to 10 passengers. Set of 8 prints \$1.50.

**"HI-HO" 14-FT. FAMILY RUNABOUT**—840 to 845: Powered by 11 to 22 hp. outboard or a converted Ford motor. Set of 6 prints \$1.00.

**12-FT. ROWBOAT**—707: Flat bottom. Can be used with small outboard motor. 25c.

**"SEA SAUCER"**—893: Lightweight sailboat. Length 9½ ft. Planked with 3/16-in. plywood. 25c.

**10-FT. ROWBOAT AND AUTO TRAILER**—551: Wonderful combination for week-end trips. 25c.

**SECTIONAL ROWBOAT**—905: Length 12 ft. Three sections occupy space only 6½ ft. long when nested. 25c.

**CANVAS-COVERED KAYAK**—928 and 929: Light framework covered with canvas. 17 ft. in length and accommodates single passenger. Two prints 50c.

**DOUBLE-END DUCK BOAT**—703: 10 ft. long. Wooden frame covered with canvas. Can be carried on automobile. 25c.

Any six of these blueprints will be sent postpaid upon receipt of \$1.00

Blueprint Department, Popular Mechanics Magazine, 200 E. Ontario St., Chicago



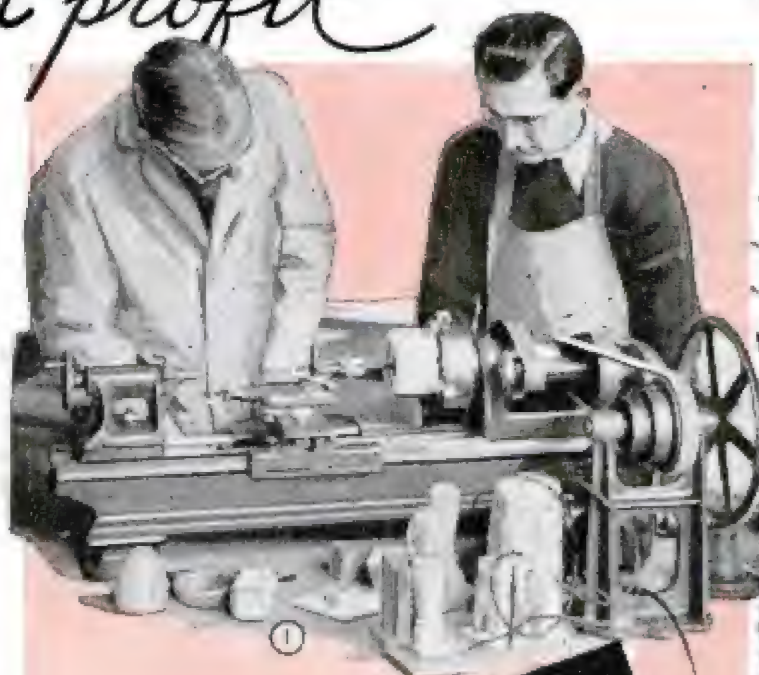
*Duty on stone to Canada three  
times cost of stone. 3/15/1948  
same applies to Mexico*



# *Turning* ALABASTER *for profit*

**H**OW would you like to try this new material on your wood or metal-turning lathe? It turns as easily as soft pine, shapes into curves, beads and undercuts without chipping and finishes glass-smooth with very little polishing. Under the turning tool and in your hands alabaster has the "feel" of soapstone yet is sufficiently strong and durable to make up into such useful projects as shown in Fig. 2. When finished properly its beauty and rich luster are comparable to the finest marble.

Alabaster is a natural mineral product whose infinitely fine particles have been laid during past ages by trickling underground water. So soft and fine are the



particles of which it is composed that the edge of a wood-turning chisel will stand up as

long as in any hardwood. Unlike wood or plastics, which produce shavings when cut, the "dust" from alabaster leaps away from the chisel edge in a steady stream as in

*Walter D. North  
Manager  
Alabaster Association of Craftsmen  
1943  
528  
Chicago*



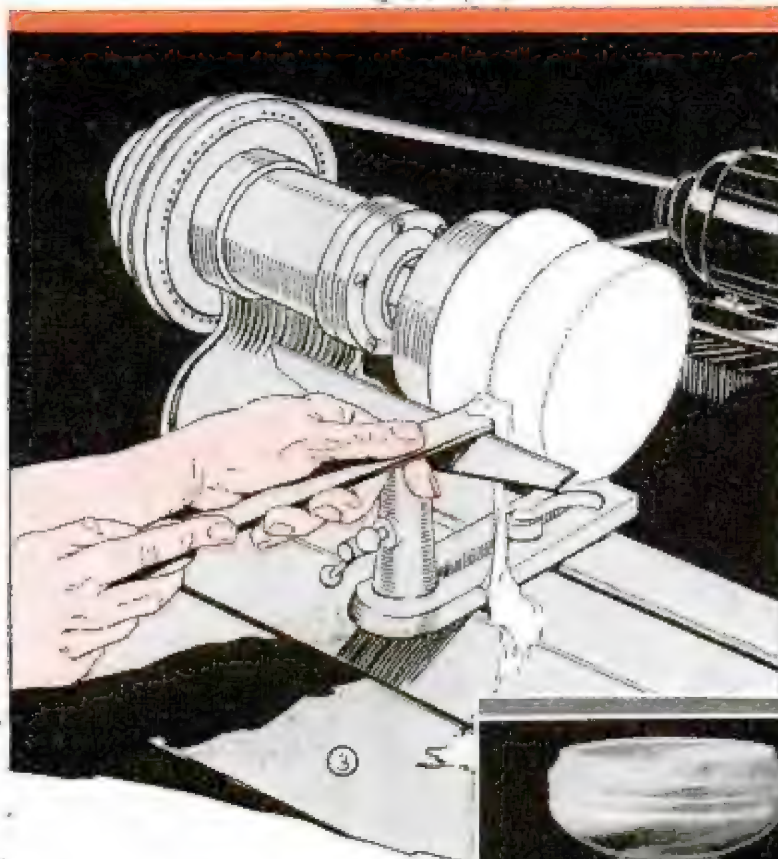


Fig. 3, and settles quickly to the floor. Once the material is turned to shape, only a light rubbing with steel wool is necessary to bring out the luster. The finish is best produced by following No. 000 steel wool with fine emery dust sprinkled on an oil-moistened rag. The polishing is followed with an application of white shellac or clear lacquer.

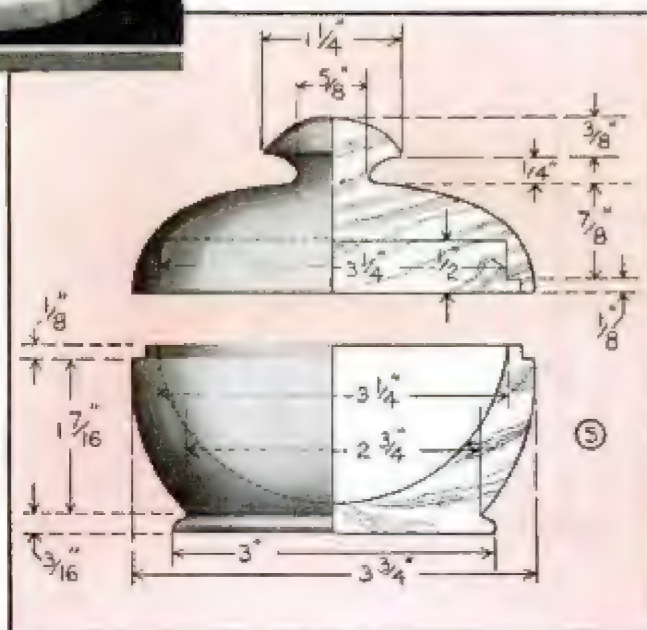
Now, after rough-turning a few small pieces to get the feel of the material, it's a good idea to begin with simple projects such as those in Figs. 5, 8 and 9. Notice in Fig. 1 that the material is being held in the chuck of a metal-turning lathe, which makes it unnecessary to glue the disk of alabaster to a backing plate of hardwood as must be done when a wood lathe is used, Fig. 6. Here the wood lathe is made to serve as a clamp by setting a second disk of wood between the work and the tailstock center and running the latter up tight. After the glue is dry, the tail center supports the work in the usual way except that very light pressure and plenty of oil must be used to prevent the center cutting into the soft material. After the

work has been trued up the tailstock is backed out of the way.

In manipulating the chisels you proceed just as in turning wood except that the tool always acts as a scraper and must be handled accordingly. The lathe speed should not exceed 2,000 r.p.m.; less is better, even when the work is trued up. When undercutting a recess as in Fig. 9, use the same care to avoid getting the tool into a position where it is likely to exert a wedging action, as when turning hardwood under similar conditions. Also, one must be sure to leave sufficient waste to support the material at points of strain

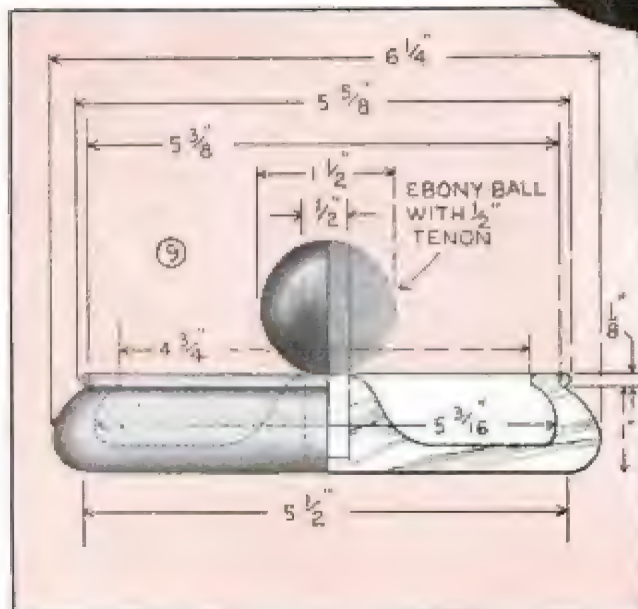
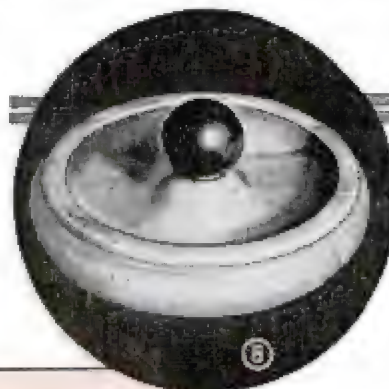
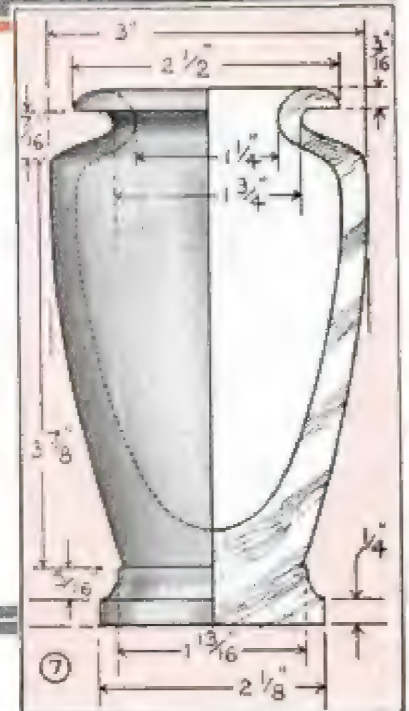
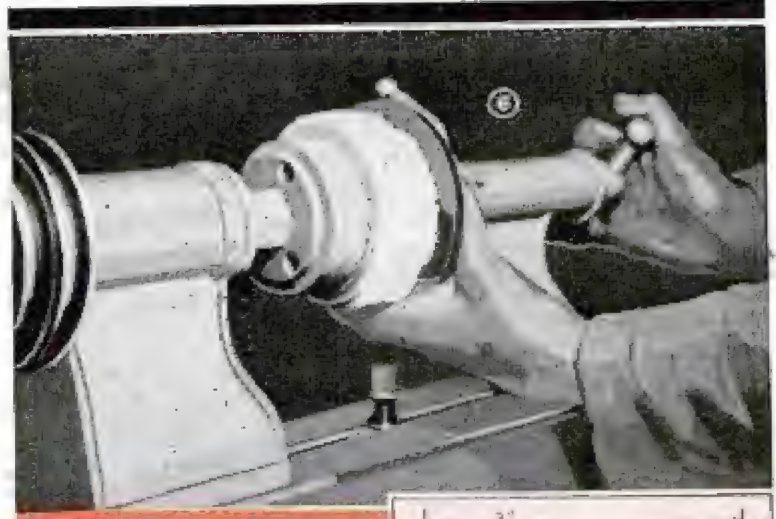
while the turning is being done. Otherwise you can do practically any turning operation on alabaster that you can do on wood but the material cannot be cut away as fast, of course.

The two-part powder box detailed in Fig. 5 and the pedestal in Fig. 4 call for very similar operations on the disk sections. Set these up as previously described, gluing each to a wooden disk which is attached to the faceplate with screws. The column of the pedestal in Fig. 4, however, offers a problem in mounting be-





tween centers. One way to set up the headstock end of the work is to cut a recess in a wood disk to take the end of the alabaster square rather loosely, then screw the disk to the faceplate. This set-up will drive small work without danger of breakage. If the piece is large,  $2\frac{1}{2}$  or 3 in. square, then you can drive safely with the spur center if the spurs are set deeply in the soft material. This must be done by hand, chipping the slots for the spurs with a knife or chisel. You cannot drive the center into alabaster as you can into wood. The same is true of the tail center. This is simply placed on the end of the piece and turned back and forth to ream a seat for the cup and point. Now, in roughing an alabaster square between centers where the piece is more or less irregular, you have to be careful to take very light scraping cuts at the beginning to bring the piece into round much more slowly than in turning down a square of wood. Of course, when using a metal-turning lathe the end of the stock is simply clamped lightly in the four-jaw chuck while the other end of rectangular work must be supported in a cup center inserted in the tailstock sleeve or quill. In turning out the vase detailed in Fig. 7, first mount the block, preferably in a metal-turning lathe, and bring the outside to finished contour to reduce the weight as much as possible. Then with very light cuts, you hollow out the inside, using calipers to check the thickness of the walls. Special care is necessary to succeed with this



type of work, due to the overhang from the point of support. The danger is in a sudden violent strain caused by the chisel binding or digging in too deep. One thing to look out for particularly is the adjustment of the tool rest in relation to the axis of the work. The top of the tool rest on a wood lathe should be parallel with the axis of the work or just below it to bring the tool edge into such a position that it is easy to control. The handle of the wood chisel should be held very nearly horizontal for best results. Lastly, remember that to preserve the beauty of the work it must be polished and shellacked or lacquered immediately the turning is finished, for if exposed to the air for any length of time the delicate figure or "grain" of the material will lighten somewhat.



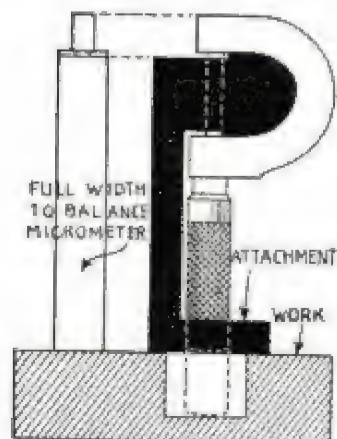
## Papers Can Be Seen on a Desk Through This Paperweight



*This office worker can see through his paperweight so that he doesn't have to lift it to check a paper*

Instead of using a solid weight to keep papers from blowing off his desk when a window is open, one office worker weights them down with a wire grille through which he can see. A grille suitable for the purpose can be picked up in a ten-cent store or taken from an old icebox. If none is available from these sources, one can be made by soldering cross wires to a wire frame about 15 in. square.

## Depth-Gauge Attachment for Your Micrometer



At little expense, a machinist who uses a micrometer can make a depth gauge for it which, while not as good as a regular depth gauge, is very handy for measuring the depths of slots, holes and shoulders within

its capacity. To make the gauge, a piece of flat steel is machined to fit the micrometer, and is drilled and reamed to clear the

barrel and spindle. When assembled as shown, the face of the attachment and the end of the barrel should be flush when the micrometer is set at zero. It is necessary to remove the barrel entirely when putting the attachment in place.

—H. Moore, Hamilton, Ont., Can.

## Switchman's Lantern Converted to Red "Flag"

As most switchmen's electric signal lanterns are equipped with twin bulbs, it is a simple matter to convert them into a combination flag and signal lamp. A small piece of red Cellophane is tied over one of the bulbs with a rubber band. The gloss of the Cellophane imparts a brilliant quality to the light which far exceeds the method of using a painted bulb.

—Tom Rooney, Chicago.



## Field Glasses Pivoted to Car Leave Officer's Hands Free

To leave both his hands free, one officer of a police squad car mounted his field glasses on a "lazy tong," which he pivoted

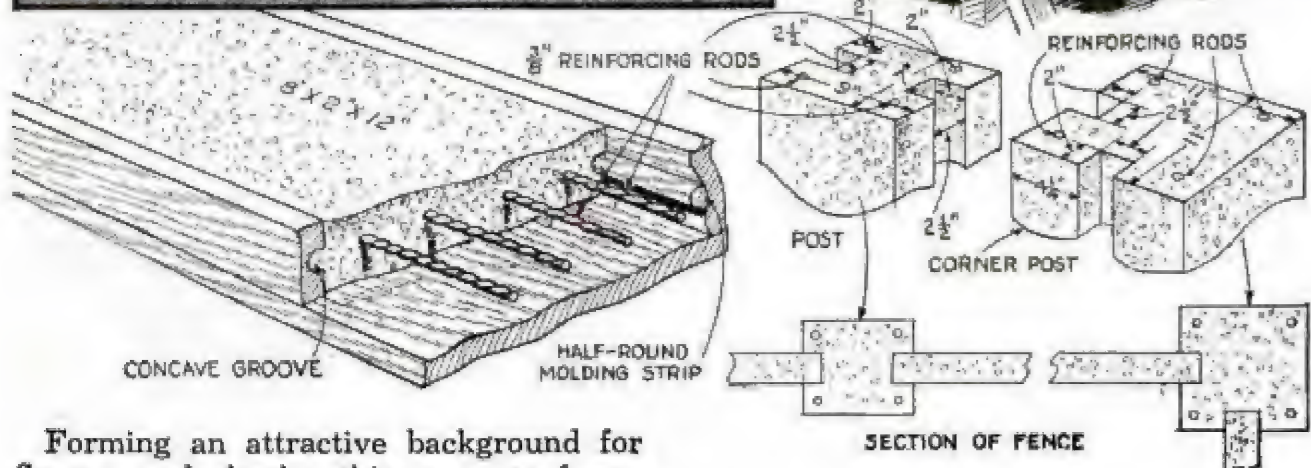
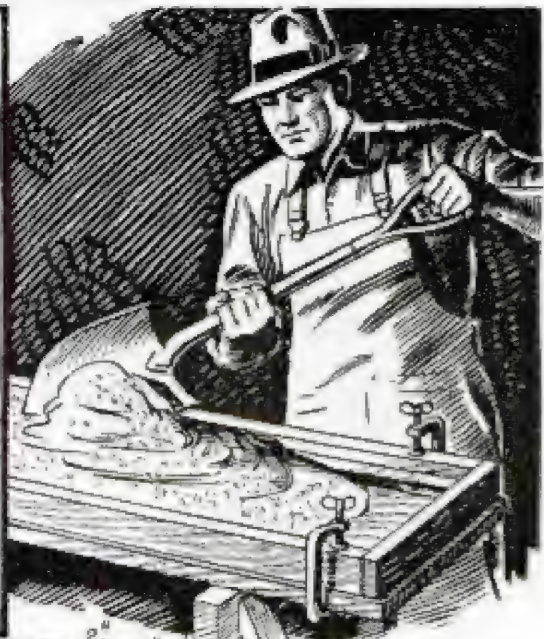


*Policeman's field glasses need not be held by hand if this "lazy tong" support is provided*

to one of the front body posts of the car. When not in use, the glasses are pushed out of the way, but are pulled out quickly when needed.



# Solid Fence of Concrete 'Boards' Gives Privacy



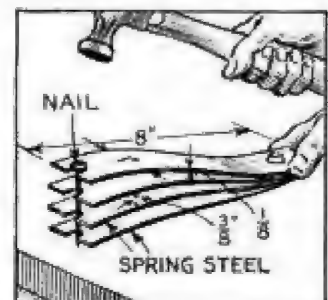
Forming an attractive background for flowers and shrubs, this concrete fence, which is cast in sections and then assembled, will last indefinitely. Forms for the casting job are easily made. The concrete planks are 2 in. thick, 12 in. wide and 8 ft. long, and are reinforced with four  $\frac{3}{8}$ -in. rods, while the posts are 7 by 9 in. by 8 ft. long with 1 by 2-in. grooves cast in the sides to receive the ends of the planks. The posts are also reinforced with rods placed 1 in. from each corner. To make the fence tight, one edge of each plank has a tongue cast on it while the other side has a groove cast in it. Use a stiff concrete mixture and tamp it firmly into the forms. When setting the posts, they must be spaced accurately so that the ends of the planks fit perfectly into the grooves.

—H. O. Hayes, Wilmette, Ill.

☞ Silk may be removed from ears of green corn more effectively with a vegetable brush than with the hands.

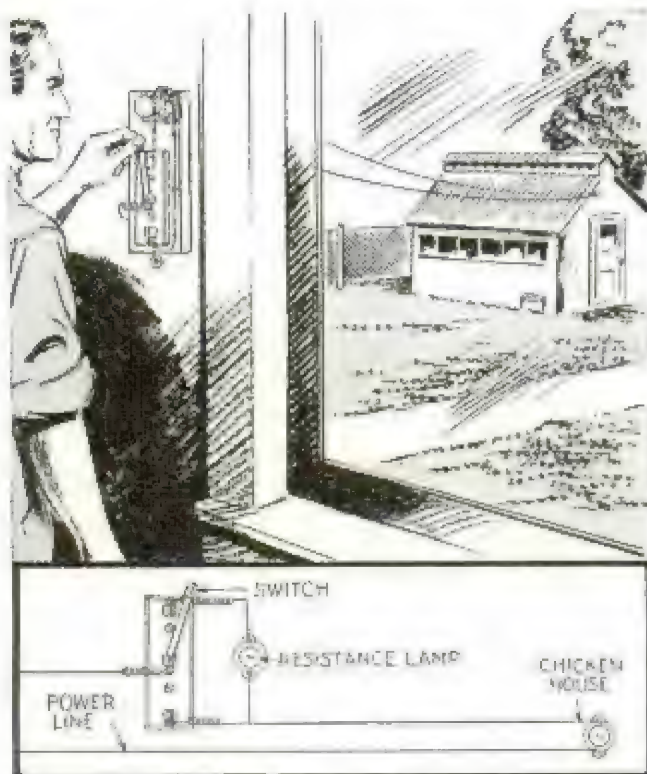
## Thin Nails Driven in Hardwood Without Bending Them

Here's a tool that tends to strengthen long, slender nails when driving them into hardwood and helps to keep them from bending. The tool consists of four strips of spring steel or brass 6 or 8 in. long. These are riveted or bolted together at one end and a notch is cut or filed in the center of the free end of each strip to straddle the nail. The strips should be bent apart slightly so that the free ends tend to spread. In use, the nail is started, after which the tool is held snugly against it.





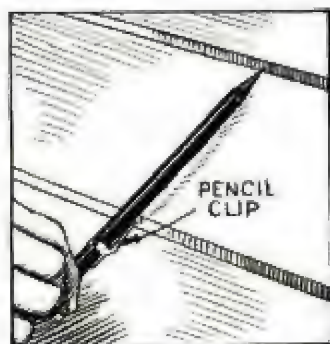
## Poultry-House Lights Dimmed Before Turning Them Out



*Switch to dim or turn off lights at poultry house saves many steps for poultry raiser*

Finding that it was necessary to dim the lights in his poultry house a few minutes before turning them out entirely so that the chickens could find their way to the roosts, one poultryman installed a switch and resistance lamp at the house. A s.p.d.t. switch and a lamp of about the same wattage as those used in the poultry house were installed as shown in the detail, so that when the switch was thrown one way, the current passed directly to the poultry-house lamps, and when thrown in the opposite direction, the current passed through the resistance lamp.

## Gauge to Lay Siding on Building Improvised from Pencil and Clip



Although carpenters lay house siding with equal surfaces exposed to the weather, and a standard gauge may be used for this purpose, the same spacing must often be al-

tered to divide equally along the casing of a door or window so that there will be no jog in the lines above or below. In such cases, one builder uses his pocket pencil and clip as a gauge. The required divisions are determined with dividers and the clip is set on the pencil accordingly.

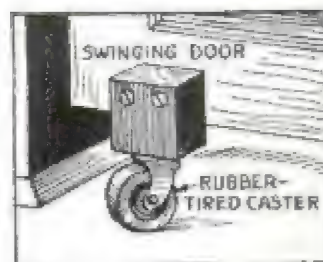
## Lard-Impregnated Emery Wheel to Grind Aluminum

Having about 20 ft. of welded seams in an aluminum tank to smooth up and, not having a special wheel on hand to use with a flexible-shaft grinder, an ordinary emery wheel was placed in a can of hot, melted lard and allowed to absorb all it would. In use, the wheel did not pick up particles of aluminum as it did before being treated. The heat developed by friction together with centrifugal force was sufficient to keep the wheel lubricated.

—G. R. Boulden, Birmingham, Ala.

## Caster Keeps Door from Sagging

In one office a rubber-tired caster was fastened to the bottom of a heavy swinging door to relieve the hinges from excessive strain. It



was found necessary to fasten a wood block to the door to lower the caster enough to allow it to rest on the floor.

## Tape Roll Nicked on One Side Is Easy to Tear Off



If four evenly spaced cuts are made about  $\frac{1}{8}$  in. deep in each side of a roll of friction tape, strips can be torn off at any one of these points with ease. Also,

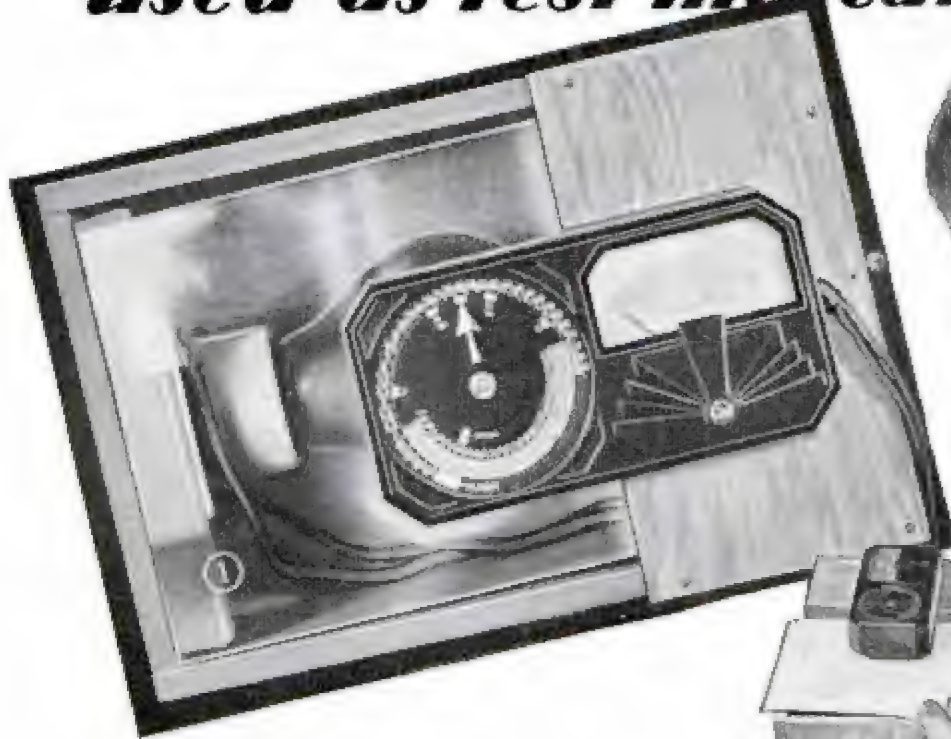
the usual tendency of the edges to fray as the tape is unrolled will be minimized. The cuts will not materially weaken the tape for its normal uses.



*Weston exposure meter -  
sold by Central Camera Co.  
230 S. Wabash, Chicago*

# EXPOSURE METER

*seems to be same* *2.25*  
***used as test indicator***



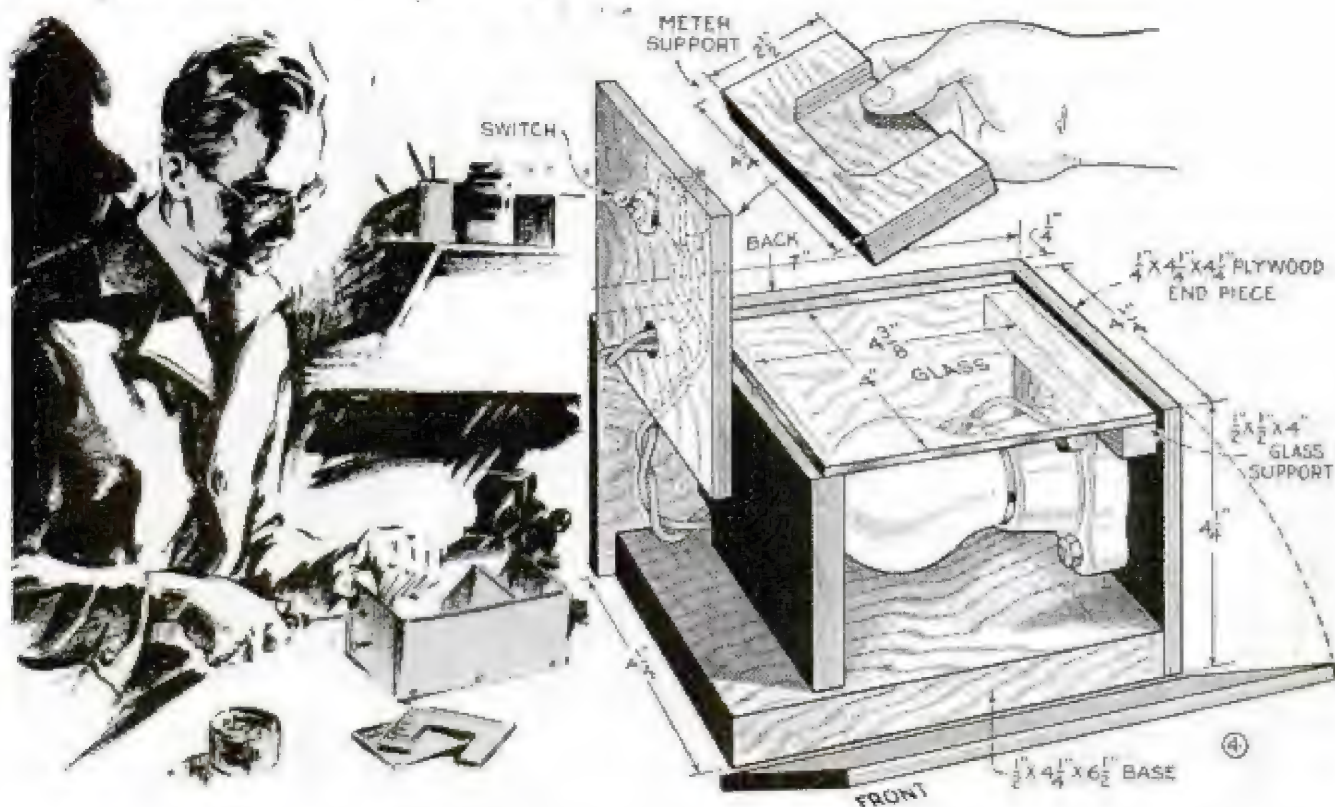
By Robert Hertzberg

**I**N MANY industries the relative opacity of materials is of considerable importance and the time-honored custom of holding fabric, paper and other material up to the light for visual observation is not sufficiently reliable to make tests of various degrees of opacity. A much better and more accurate method is to use an "opacity meter," the basis of which is a photoelectric exposure meter designed for photographic use. To convert such a meter into an opacity indicator capable of testing materials up to  $\frac{1}{4}$  in. thick, it is mounted over a fixed light source, the light being placed in a plywood box. The dimensions and assembly of the whole outfit are shown in Figs. 1 to 4. The base is a piece of  $\frac{3}{4}$ -in. white pine, the sides and ends are of  $\frac{1}{4}$ -in. plywood, and the supports consist of a few pieces of scrap stock.

After cutting the parts required for the base, sides and glass supports, screw a porcelain-base lamp socket to the inside of the left side member and mount a single-pole single-throw snap switch on the right side piece. Then connect the socket







and switch in series with a length of flexible cord. Put in the glass supports and nail the box together. A discarded 4 by 5-in. photographic glass plate is just right to cover the opening above the light bulb to keep out dirt and lint. Put a couple brads into the right-hand upright piece to keep the glass from slipping out of place. Next, you cut two pieces of  $\frac{1}{4}$ -in. plywood, each  $2\frac{1}{2}$  by  $4\frac{3}{4}$  in. Place the exposure meter over the short center line of one piece and balance it so that the cell section on the underside overhangs the edge. Carefully trace the outline of the case with a sharp pencil and cut out the U-shaped opening with a coping saw, working on the inside of the lines so that the meter case will fit snugly. The two pieces are then stacked as in Fig. 2 and nailed to the right end of the box as in Fig. 3.

Experiment has shown that an ordinary 25-watt inside frosted lamp gives full-scale deflection of an exposure meter of the type shown. Thus anything placed between the lamp and the meter will reduce the reading. Since the numbers on the meter scale mean nothing by themselves for this purpose, they must be interpreted in relative values. Hence, in the beginning the user should take readings of samples of the very best quality materials, that is, paper, real and imitation silks, screening, ribbon, shades, etc. Very frequently it is

difficult to determine whether goods have the same characteristics as the original samples. However, indicator readings from random samples of the new material compared with those of the originals will show any discrepancy at once. As the lamp is used only a few minutes at a time, it will last almost indefinitely. Should replacement be necessary, the readings of the standard samples should be rechecked.

### Tray Has Box for Silverware

Waiters' trays in one restaurant are fitted with small metal boxes soldered to the trays to hold silverware as the service is cleared from the tables. The boxes keep the silverware from being mixed with the dishes, thus simplifying the job of the dishwasher.



### Marking Depth Gauge on Drills

Instead of nicking the shank of a star drill used in an electric or pneumatic hammer, in order to indicate the depth to drill certain holes, wrap two or three turns of



friction tape around the shank at the required height from the lower end. The tape is removed easily and will not damage the drill. If the shank is nicked with a file, it is likely to snap off at this point because tool steel from which star drills are made, is very hard and a score on the surface affects it similar to a score in glass, which, of course, is broken by scoring it with a glass cutter.

### "Eave Trough" on Tar Bucket Protects Side of Building

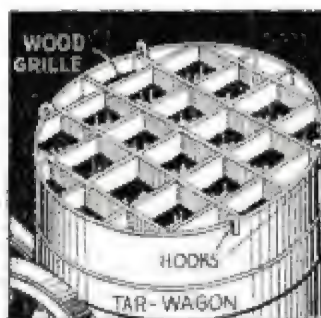


Soldered to the side of a bucket used to hoist hot tar to a roof, a sheet-metal trough will catch any tar that might spill over the side of the bucket onto a sidewalk, shrubbery or the wall of

the building being repaired. If the bucket has been in use, care must be taken to remove dried tar and rust before soldering the trough in place.

### Splashing of Liquids in Barrels Avoided by Wood Grille

Assembled from thin wood strips, a grille of the type shown can be placed in the top of a barrel to keep liquid from splashing while hauling it. The grille is especially handy for contractors who move open barrels of tar and other liquids from one job to another. It is also convenient for farmers who sometimes have to haul water in barrels during a dry season.



☐ Taking photos on a windy day is simplified by weighting the focusing cloth with slit Fuller balls. Or, you can hem one end of the cloth and insert an elastic band, so the cloth can be stretched over the front of the camera.

### Shelf Hinged to Door of Truck Aids the Driver

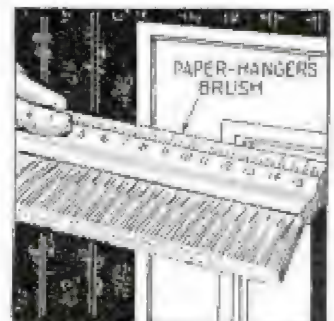


*A hinged shelf on the door of your delivery truck is handy for holding baskets while sorting articles*

Drivers of light delivery trucks for grocery and other stores will find that a shelf hinged to one of the rear doors is very convenient when loading or unloading. Baskets and large packages can be set on it while sorting articles for the customers. The shelf is held in a lateral position by small chains, and when not in use, it folds up against the door where it is held by a spring catch.

### Scale on Paper Hanger's Brush Saves Time

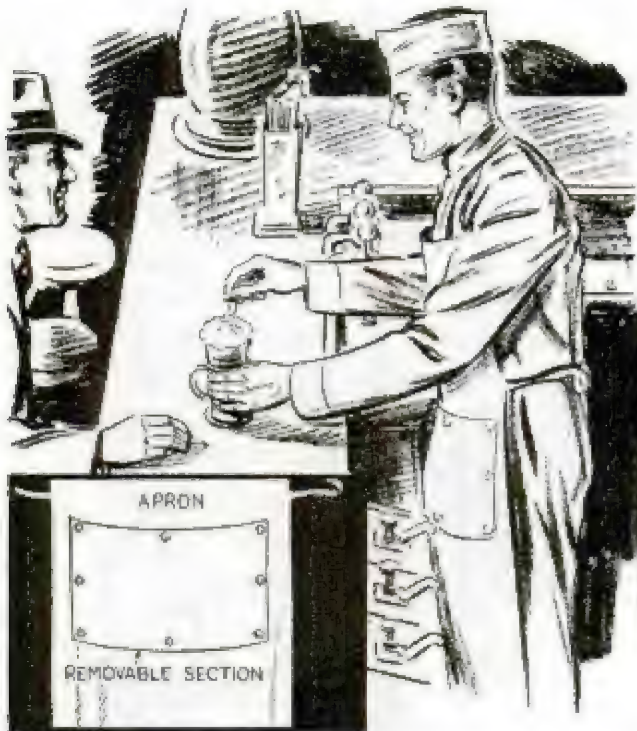
Scored in one side of a paper hanger's brush, a scale is always at hand for quickly checking lengths and widths of wallpaper strips. The scale can be scored deeply into the wood with a sharp-pointed instrument, after which the wood is given a coat of black paint, the latter being wiped off immediately to leave the markings black.



—Guy Wheeler, Eureka Springs, Ark.



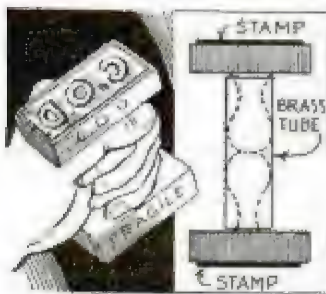
## Soda-Fountain Clerk's Apron Has Removable Front



*When the front of this clerk's apron becomes slightly soiled, he just unbuttons it and puts on another*

To reduce laundry bills, the owner of one drug store provided the clerks of his soda fountain and lunch counter with aprons having removable fronts which can be changed frequently and laundered inexpensively. The front is a square of cloth which buttons to the apron.

## Double Rubber Stamps Save Time



Instead of picking up rubber stamps individually, one shipping clerk fastens them together in pairs. This was done by squaring the rounded ends of

the handles so that they butted together nicely, after which they were slipped inside a short brass tube.

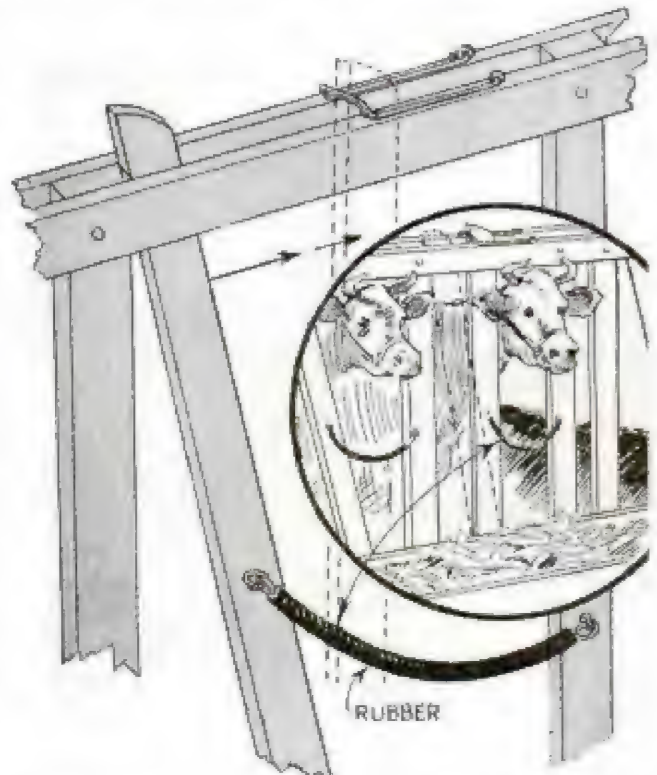
## Checking the Tendency of Bees to Swarm

The tendency of bees to swarm is often caused by congestion of young bees in the brood box, and can be lessened by provid-

ing large space between the bottom bars of the frames and the floor of the hive. In most hives this space is  $\frac{7}{8}$  in. A space 2 in. deep or more would be better, so far as swarming is concerned, if the bees would not build a comb in the space. Such a space can be used by adding a 2-in. super and putting in a slatted rack under the frames to prevent building a comb below. These slats, twenty in number, are made separate and like the ten frames fit on tin rabbets or shelves. It must be remembered, however, that it is natural for bees to swarm when they need expansion.

## Self-Locking Cow Stanchions Operated by Animals

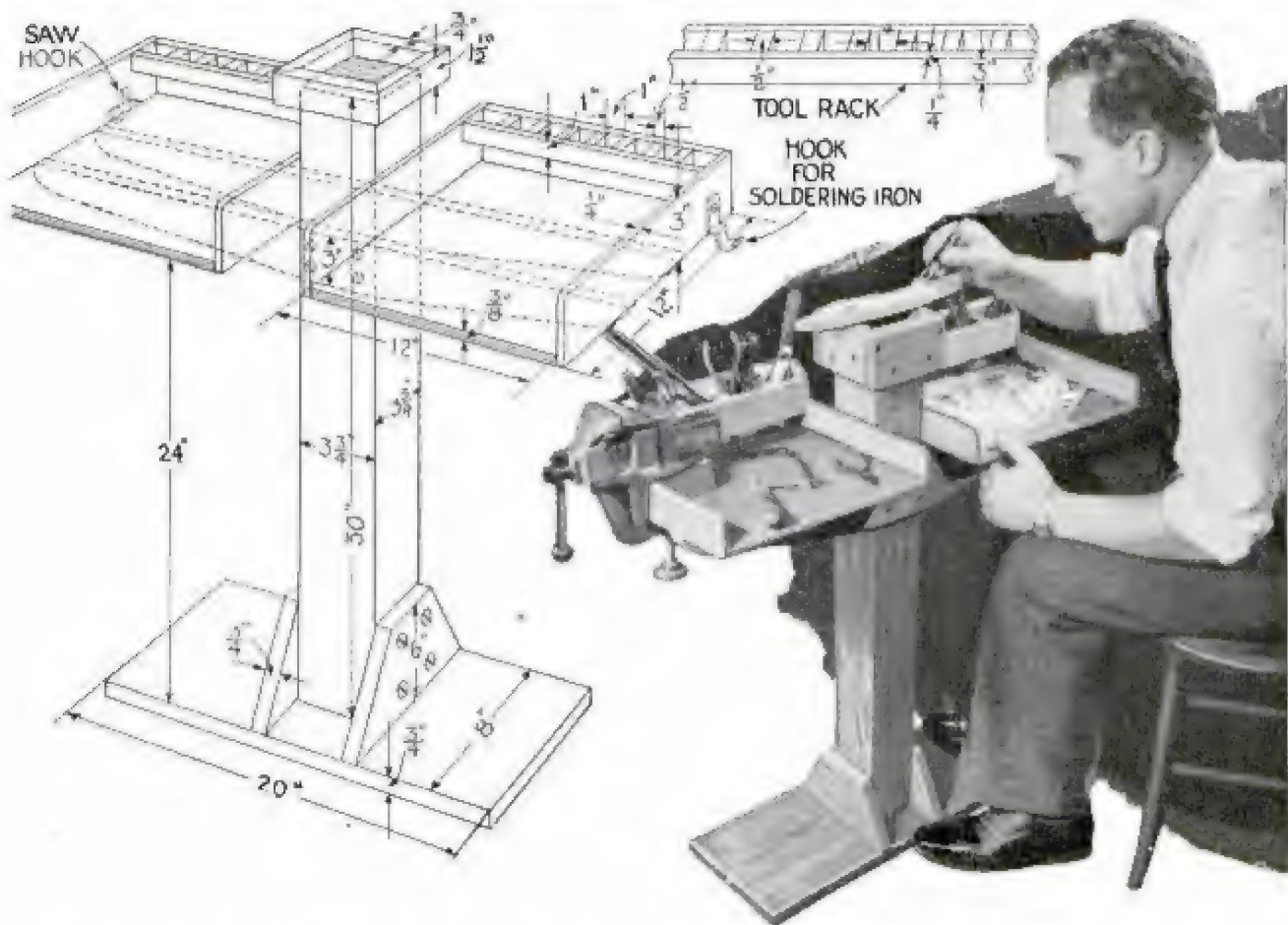
To eliminate the necessity of following his cows into the stalls to lock the stanchions, one farmer provided each stanchion with a simple lock, which automatically closes when the animal feeds. The lock consists of a length of rubber from an inner tube, twisted into a stout cable and stapled to the stanchion bars. In use the stanchions are left open so that when a cow places her head between the bars to eat, she forces the rubber cable down, pulling the movable bar into upright position where it is immediately engaged by a wire loop at the top of the stanchion frame.



*When a cow puts her head into these stanchions to feed she automatically locks them*



## Modelmaker's Bench Stored in Small Space



Here's just the thing for the modelmaker who wants his bench and tools in a compact unit that can be set away in a closet or other small space when not in use. The bench has two trays or working tops, two tool racks, a place for a small vise, hooks

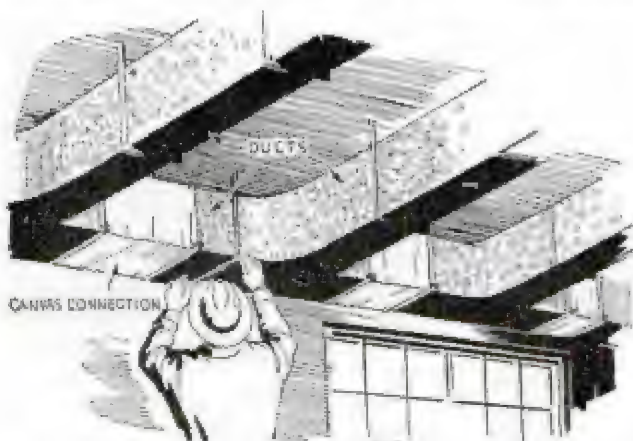
for a saw and soldering iron, and a depression at the top of the standard to accommodate a small anvil. In use, you sit at the bench with the feet placed on the base to help prevent tipping.

—Al Belanger, Chicago.

## Stopping Noise Transmission in Sheet-Metal Duct System

On a job of installing sheet-metal ducts, the problem of noise vibrations being carried by them to all parts of the building

was solved by installing canvas connections in the ducts. The connections were put in the main duct at the location of every branch line. In this way, each line was insulated from the others so that no matter in what part of the building the vibration originates, it cannot be transmitted to the rest of the duct system.



Canvas connections in duct system prevent noise vibrations from carrying through a building

## Preserving Natural Fish Bait

When natural fish bait, such as minnows, grasshoppers and other insects, is plentiful, it can be dried and preserved for future use. To do this, just bait a number of hooks, immerse them in collodion and then lift them out and dry. This coating is tough and waterproof and excludes air.



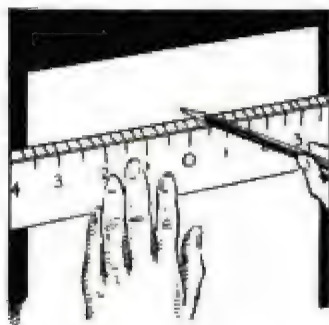
## Singletree from Auto-Wheel Rim for Use with One Horse



*When towing small logs or pulling beams into place with one horse, this singletree is just the thing*

When a horse is used to pull heavy beams into place on construction work, or for lifting hay into a barn, this singletree is handy as it can be placed on the horse's back to avoid bumping its heels when there is no load. The singletree is nothing more than one half of a demountable auto-wheel rim, which is fitted with hooks at the ends for attaching the traces. A large hook welded in the center of the rim takes the tow rope or chain.

## Printing Jobs Quickly Centered by Double Ruler



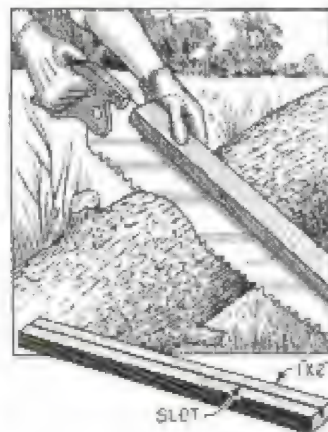
use a double ruler with the zero mark in the center and the remaining numerals marked each direction from that point. In

To save time in centering forms for printing letter-heads and cards, and to eliminate much of the guesswork of make-ready and the re-setting of the feeding guides,

use, hold the ruler on the first impression taken on the impression sheet, and bring the equivalent marks at each end of the printed line. The center may then be marked on the impression sheet.

## Removable Stiffener Starts Saw Without Vibration

Have you had difficulty in starting a one-man saw in a log because it vibrated from side to side? If so, just take a 1 by 2-in. strip of wood, cut a slot  $\frac{1}{2}$  or  $\frac{3}{4}$  in. deep along one side and hold this over the back of the saw to stiffen it while starting the cut. After the saw has been started, lift off the wood strip.



## Metal Stencils Fitted with Tacks to Leave Worker's Hands Free



If small tacks are soldered to the underside of metal stencils, they need not be held by hand. When one is laid in place and pressed down lightly at the corners, the short tacks penetrate the wood and hold the stencil while

paint is applied. When using a stencil against one side of a box or package, the tacks help to prevent slipping.

## Keeping Photo Film Moist

If your photo film dries due to improper storage, place it on a shelf in a damp part of the cellar overnight. Natural absorption of moisture will follow. Water should not come in direct contact with the film. If a damp spot cannot be found, place it in a box and in the same box, place a wet sponge.—C. W. Mehl, Jersey City, N. J.



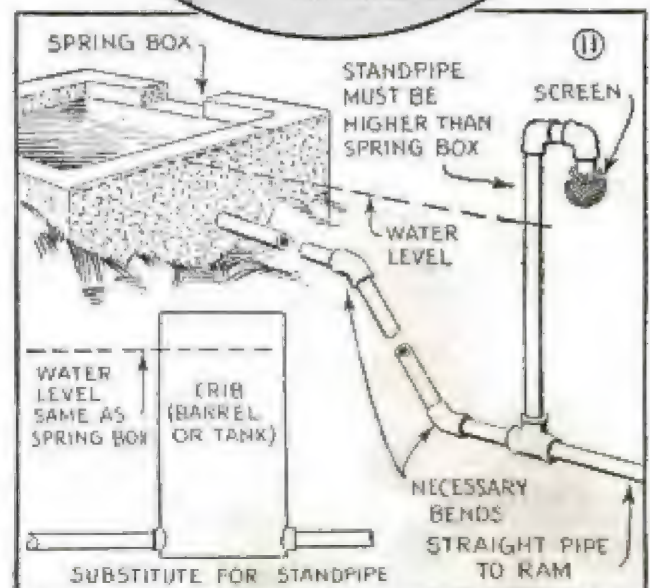
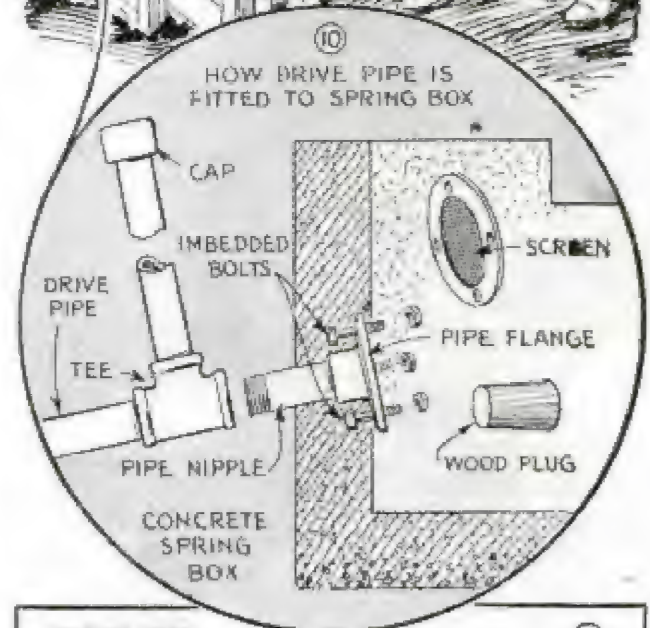
# *This* HYDRAULIC RAM *is made from pipe fittings*

By C. A. CROWLEY

## Part II—Design, Construction and Installation of Rams

**A**FTER surveying the spring or stream as explained in Part I of this article, we will now proceed with the design and construction of a ram. The initial step is to find the size of the drive pipe, that is, the pipe which runs from the spring to the ram. The chart shown in Fig. 12 makes this easy. First refer to the bottom of the chart and locate the number corresponding to the gallons of water per minute which must be furnished to the ram. Continuing with the example that was followed in Part I, which required 8 gals. per minute, we locate 8 gals. per minute at the bottom of the chart, draw a vertical line to the curve, and at the point where this line crosses the curve, draw a horizontal line to the left-hand side of the chart and find that a ram pipe size between  $1\frac{1}{4}$  and  $1\frac{1}{2}$  in. will be required. Accordingly, we will select the nearest larger standard pipe size, or a  $1\frac{1}{2}$ -in. pipe. The delivery pipe that runs from the ram to the supply tank should be one-half this diameter, or in this case,  $\frac{3}{4}$  in. In all cases where the size of pipe required comes out a fraction under standard size of pipe, then the next larger standard size should be used. In no case should the smaller size be used as this would tend to reduce the rate of flow to an extent which would probably interfere with the satisfactory performance of the installation.

Fig. 10 shows a method of attaching the drive pipe to the crib or spring box. The spring box, preferably of concrete, should be constructed so that all of the water, or a sufficient amount of it, flows into the box. The side from which the excess water is to be allowed to overflow should be made a few inches lower than the rest of the box so that the surplus will flow in the





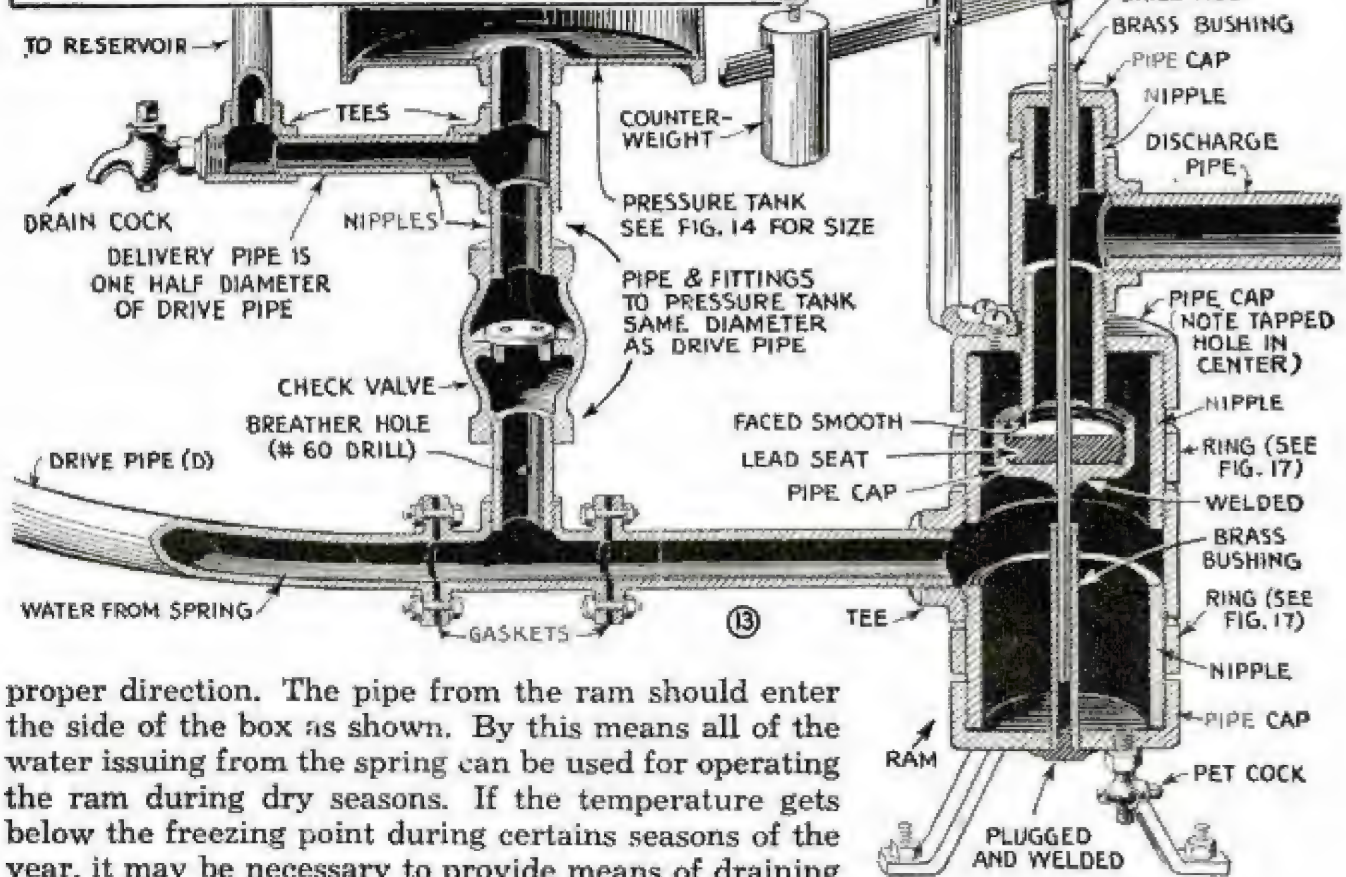
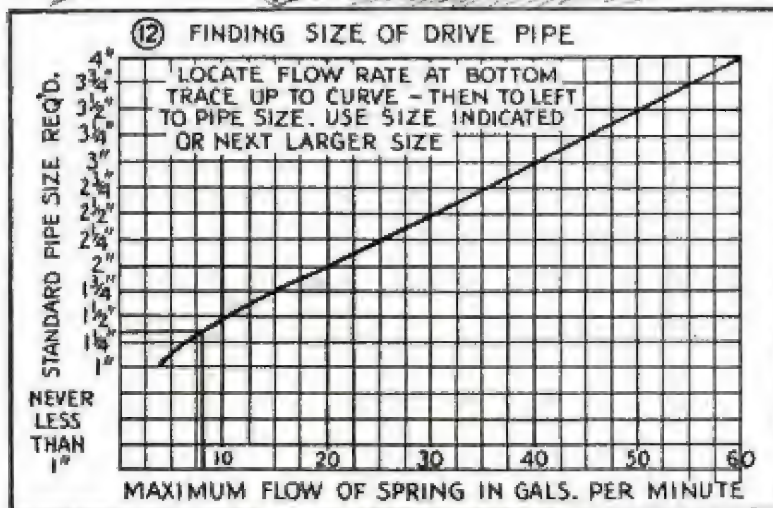


the ram pipe and delivery pipes in order to prevent their freezing. In this case the screen, which ordinarily covers the pipe opening at the spring box, is removed and a wood plug inserted to prevent further flow, after which the cap on the vent pipe is unscrewed so that the draining of the pipe is assured. Then drain cocks at the ram and pressure tank are opened to release all water in the installation.

The ram pipe should be run straight from spring to ram, if possible. If this is impossible, one of the methods shown in Fig. 11 may be used. The standpipe must be of the same or of larger diameter than the drive pipe and must extend vertically to a height a few inches above the level of

the water in the spring tank. This pipe has a "goose neck" at the top to prevent the entry of dirt. A screen should also be placed over the open end to prevent insects from entering. Similar cautions are required in the use of the crib which may be used as a substitute for the standpipe.

Having determined the pipe sizes and laid out the ram line, we are ready to construct the ram.



proper direction. The pipe from the ram should enter the side of the box as shown. By this means all of the water issuing from the spring can be used for operating the ram during dry seasons. If the temperature gets below the freezing point during certain seasons of the year, it may be necessary to provide means of draining



Fig. 13 shows details for the assembly of an effective type of ram which can be made from ordinary pipe fittings. Note that all of the dimensions are figured from the diameter and length of the ram pipe as shown in Fig. 14. The pressure tank should have a capacity in gallons approximately equal to the volume of the drive pipe. Applying the simplified formula given in Fig. 14 to our example, we first multiply the diameter of the drive pipe by itself. Thus for a  $1\frac{1}{2}$ -in. drive pipe, we get 2.25. Next we multiply this by the length of the drive pipe in feet, assumed to be 100 ft. and then by 0.041 to find the size of the pressure tank in gallons. Performing this operation, we get 2.25 times 100 times 0.041 equals 9.2 gallons. A 10-gal. expansion tank of the kind used on hot-water heating systems will be satisfactory. The tank selected should not be smaller than 9.2 gals. and preferably not much over 15 per cent larger.

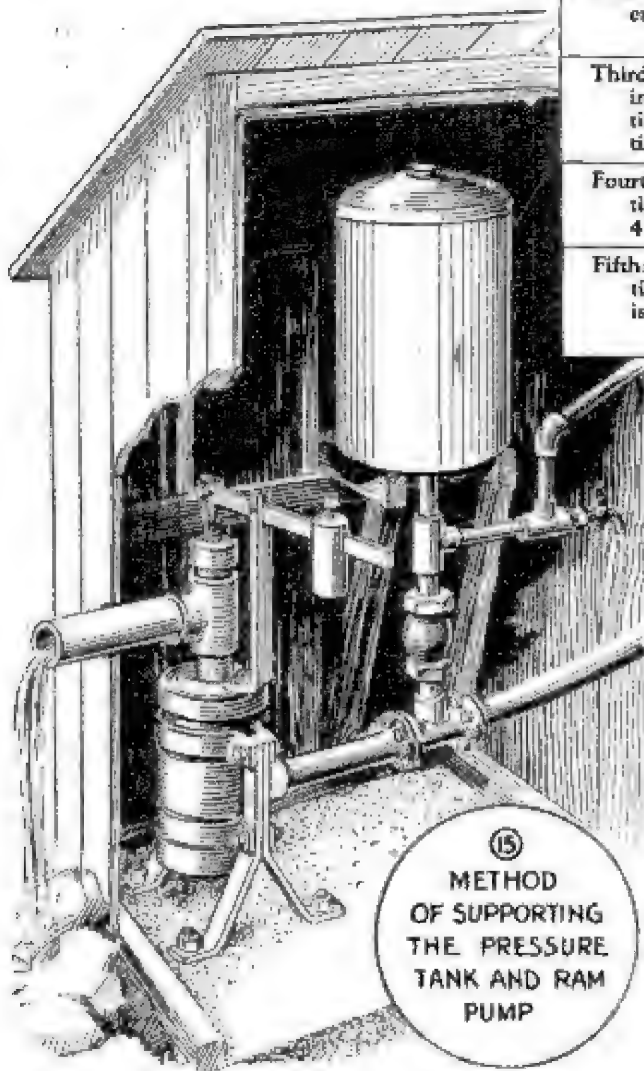
The ram proper is made from



DESIGN DATA TO DETERMINE SIZE OF PIPE, ETC.

FIG. 14

Procedure	Example
First: Find drive-pipe diameter from Fig. 12. Call this "D"	As 8 gal. per min. is flow from spring, Fig. 12 shows drive pipe should be $1\frac{1}{2}$ in.
Second: Find diameter of delivery pipe. This should be $\frac{1}{2}$ D	$\frac{1}{2}$ of $1\frac{1}{2}$ gives $\frac{3}{4}$ in. for size of delivery pipe. Never use pipe less than $\frac{1}{2}$ in.
Third: Find size of pressure tank in gallons. This is D times D times the length of drive pipe times .041	$1\frac{1}{2}$ times $1\frac{1}{2}$ times 100 (length of drive pipe) times .041 equals 9.2 gal. required size of pressure tank
Fourth: Find size of pipe and fittings for ram. This should be 4 times D	Drive-pipe dia. $1\frac{1}{2}$ in. times 4 gives 6 in. for size of ram pipe and fittings
Fifth: Find size of pipe and fittings for discharge pipe. This is $1\frac{1}{2}$ times D	Drive-pipe dia. $1\frac{1}{2}$ in. times $1\frac{1}{2}$ gives $2\frac{1}{4}$ in. for size of discharge pipe and fittings.



15  
METHOD  
OF SUPPORTING  
THE PRESSURE  
TANK AND RAM  
PUMP

sections of pipe and fittings whose diameters are four times the diameter of the drive pipe. Therefore, in our example, we must use 6-in. pipe and fittings for the ram. The ram discharge pipe should be  $1\frac{1}{2}$  times the diameter of the drive pipe. All of these values are given in Fig. 14. The ram valve is made by drilling a hole exactly through the center of a pipe cap and pressing a length of drill rod through it as shown. The drill rod should be welded to the pipe cap as shown to prevent it from slipping. Next, the pipe cap is filled with molten lead as indicated. The purpose of the lead is to form a soft bed which can easily seat on the end of the faced pipe nipple which extends from the top of the ram. This rod is guided by the top insert of brass tubing and a similar length of brass tubing in the bottom cap of the



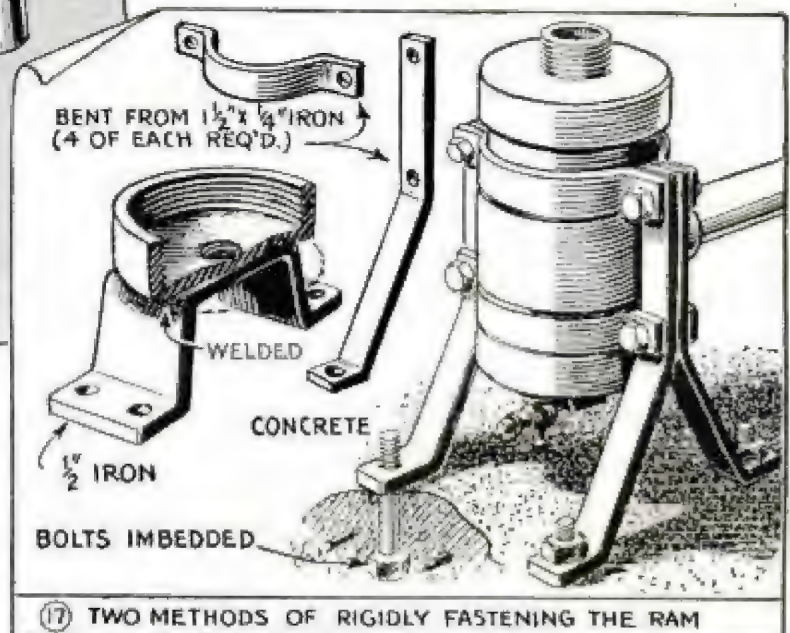


ram as shown. The end of the drill rod which projects through the top pipe cap should be drilled and coupled to the counterbalancing arrangement shown in Fig. 16.

When these parts are properly assembled and the ram installed rigidly, which can be done as shown in Fig. 17, it will be found that there is a position at which the counterweight can be located so that merely touching the lever arm will cause the valve to close or open. The exact location of the weight will be found after the ram has been installed. A length of pipe may be connected to the discharge "tee" in order to guide the tail water away from the ram house. In no

case should this pipe be bent or should fittings be used, as bends would slow down the flow of water and interfere with operations. This, and a good method of mounting both the ram and pressure tank, are shown in Fig. 15.

The check valve between the drive pipe and pressure tank, Fig. 13, should be arranged so that water can flow from the ram pipe into the pressure chamber but not in the reverse direction. A substantial type of check valve of good quality should be used. Unused holes in the pressure tank should be closed carefully with pipe plugs. The tank must be tested for leaks carefully. If there is even a small leak, the "hammer" of the ram will burst it. There is one other important point which must be noted in connection with the assembly of the ram and that is the small breather hole below the check valve. This hole should be drilled with a No. 60 drill. It should be located where it can be inspected easily. The purpose of this hole is to allow the entrance of air immediately after the check valve closes. The air that enters



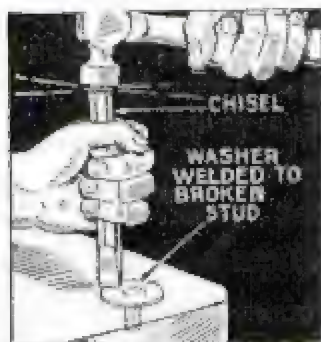
during this period collects under the valve and is forced into the pressure chamber during the next stroke of the ram. If this small hole is omitted, the air in the pressure chamber will slowly decrease, as it is absorbed by the water, and thus no air pressure will be available for lifting the water. When the installation is complete it is only necessary to remove the plug from the ram pipe in the spring box or



crib, and adjust the counterweight until the ram operates at between 25 and 30 strokes per minute or faster.

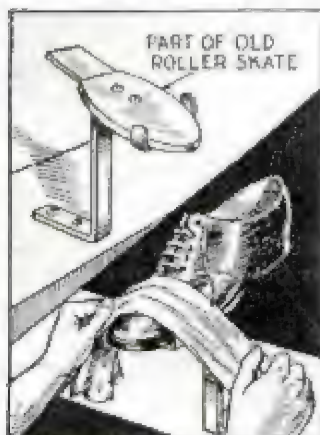
Commercial types of rams cost from \$15 to \$75, according to size and quality. They are superior, of course, to a ram made up of pipe fittings, and they involve no expense except the occasional replacement of a valve or valve seat. If a homemade ram does not stand up under the constant hammering action, and requires too frequent replacement of the valve, it will, no doubt, be advisable to improve this part of the installation by substituting a high quality manufactured ram. The instructions contained in this article on measuring the stream and determining how high water can be pumped, apply whether the ram is homemade or manufactured.

### Removing Broken Stud Bolts



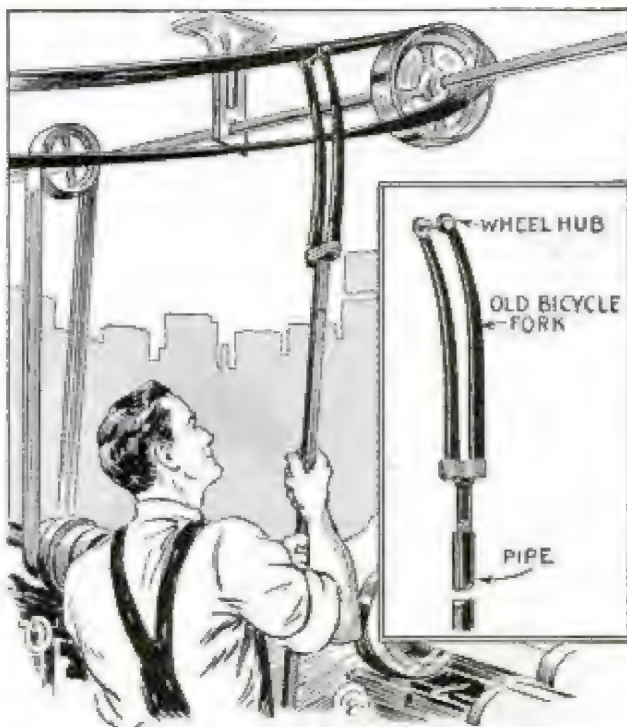
I have found the following method very effective for removing broken stud bolts that project slightly. Just weld a washer to end of the stud and then screw it out of the hole by holding a dull cold chisel at an angle against the edge of the washer and tapping it lightly with a hammer. Care must be taken in welding the washer to avoid warping the work by the intense heat of the torch flame.—Carl B. Powledge, Dale, Tex.

### Shoes Are Clamped to Stand While Shining Them



To simplify the job of shining shoes left by customers, one boy uses a stand on which he clamps the shoes to get at them easily. The standard is made of heavy flat iron to which is bolted an old roller-skate frame.

### Belt Thrown from Moving Pulley without Endangering the Hands

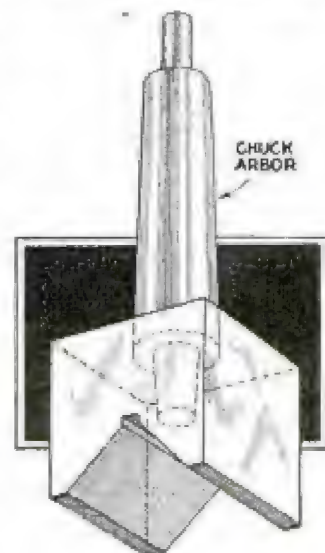


*Old bicycle fork fitted with plain wheel hub and long handle throws belts from moving pulleys*

In a western factory where it was frequently necessary to remove or put belts on moving pulleys of an overhead jackshaft, this tool was devised to do the job quickly without climbing up a stepladder. The tool also keeps the hands and clothing away from the belts so that there is little possibility of injury. To make the tool, an old bicycle fork is fitted with a hub, adjusted to turn freely, and a length of pipe is attached to the fork to serve as a handle.

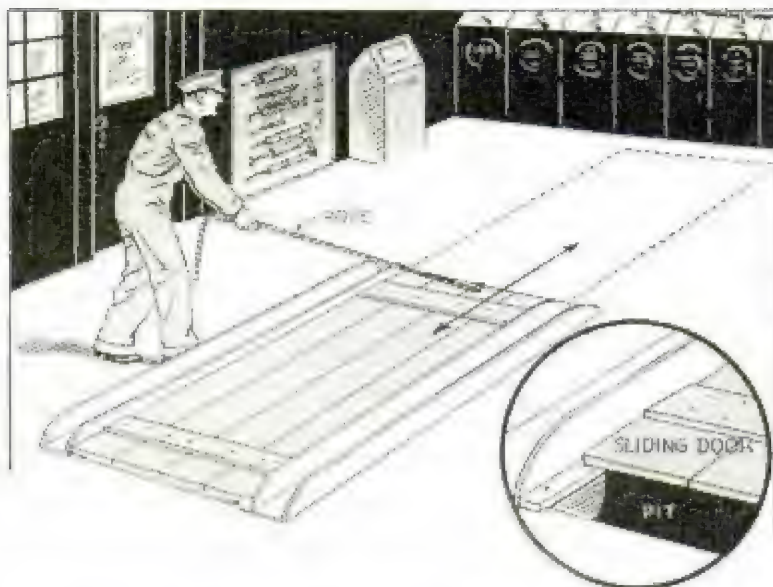
### Crotch Lathe Center Easily Made

If you have a geared lathe or drill-press chuck fitted with a tapered shank, the latter can be used in making a crotch center. Just bore a tapered hole in a V-block to take the small tapered end of the shank snugly. Then the shank can be used on either the center or the chuck.





## Sliding Cover over Greasing Pit Helps Avoid Accidents



*Sliding on well-lubricated surfaces between the wheel tracks of a greasing pit, the cover is easily moved off or on the pit*

After a small child was injured by accidentally falling into his greasing pit, one garage owner fitted it with a sliding cover, which was pulled over the pit when not in use. The cover is also useful on outdoor pits to keep leaves and dirt from blowing into them.—C. Latour, Jr., Albany, N. Y.

## Extension Jaws on Pair of Pliers to Hold Bolts in Tight Places



By brazing pieces of  $\frac{1}{4}$ -in. iron rod to the jaws of a pair of pliers, you can convert them to a tool for starting or removing nuts and bolts in places that are difficult to reach with the hands. The ends of the rods are shaped to suit the work for which they are most frequently used.

—Jos. C. Coyle, Yuma, Ariz.

## Motor Performance Is Improved by Replacing Worn Valve Guides

Worn valve guides are possibly worse in an overhead valve type of engine than they are in an L-head engine, as the rock-

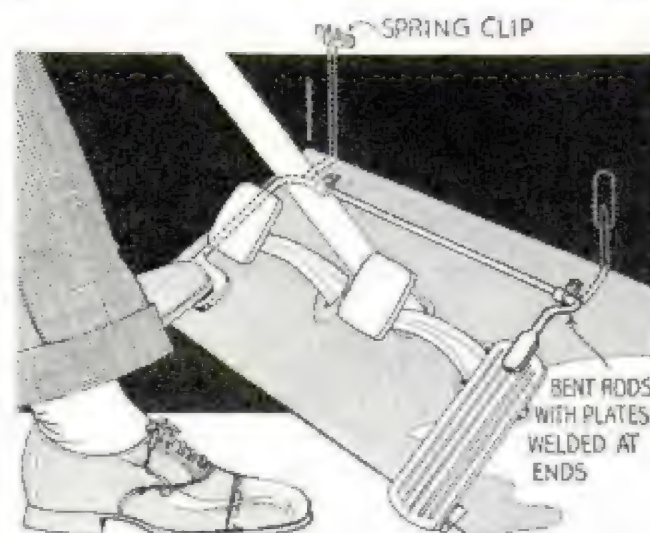
er arm, with its end traveling in an arc, has a tendency to drag the end of the valve stem sideways, causing the valve to rock back and forth in a worn guide and allowing the head of the valve to work back and forth on its seat. This condition is exaggerated if a worn spot or depression exists in the end of the rocker arm. The trouble can be minimized by grinding the rocker arm face flat where it contacts the tip of the valve stem.

## Are Both Headlamps On?

A positive method of learning when one automobile headlamp bulb is burned out is to make a note of the normal battery charging rate, as indicated by the ammeter when both lights are burning. Then, when one lamp is out of service, the fact will be signaled immediately by an increase in the charging rate.

## Extra Accelerator Pedal Eases Strain on Driver's Feet

On long trips you'll appreciate this extra foot accelerator which allows you to use the left foot to control the gas feed. It consists of a length of iron rod flattened



*You can feed gas with either foot when this extension pedal is installed on the floor of your car*

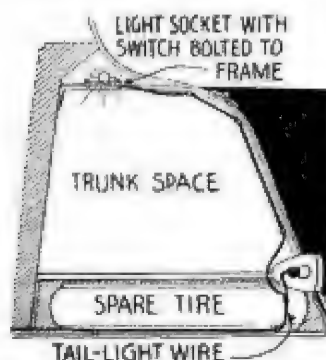
slightly at one end to bear on top of the regular accelerator pedal and at the other to provide a surface for your foot. The extension is fastened to the floor with



flat-iron brackets, which serve as bearings. A spring clip screwed or bolted to the dash below the instrument panel holds the extension pedal out of the way when not in use.—Axel E. Ogren, Chicago.

### Lamp to Illuminate Car Trunk Wired in Tail-Lamp Circuit

You'll find a light in your trunk convenient, and easy to install. Just get an insulated socket for a 6-volt lamp and mount it in the top of the trunk. Then ground one side of the socket to the car frame and wire the other side into the tail-lamp circuit. It is necessary, of course, to provide a switch to operate the lamp.



With this hookup, the lamp can be operated only when the tail lamp is turned on, but it saves running a wire to the battery.

### Using Front-Wheel Assemblies to Make Light Trailers

If you build a light, two-wheeled trailer from the front-wheel assembly of a car, be sure that the wheels rotate the same way that they did when on the car, otherwise there is danger of the bearing cones tightening up and locking the wheels or ruining the bearings. Also, such trailers are likely to weave from side to side unless the tie rod is cut in two in the center and the severed ends bolted or welded to the center of the axle.—C. E. Packer, Chicago.



Sever the tie rod in the center and bolt the ends to the axle if you want to avoid trailer sway

### Tag the Luggage in Your Car to List the Contents

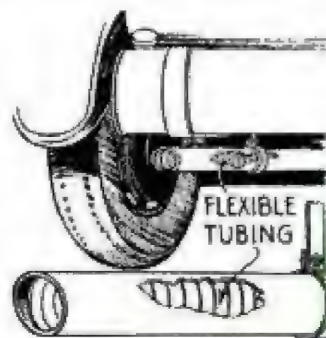


Tags attached to each piece of luggage show what each bag or suitcase contains

Have you ever rummaged through several bags and suitcases to find some needed article when on a trip or outing? If so, this inconvenience can be avoided by listing the contents of each piece of luggage on a tag and attaching it to the handgrip or strap where it can be seen in the trunk.

### Leaky Exhaust Pipe Repaired with Flexible Tubing

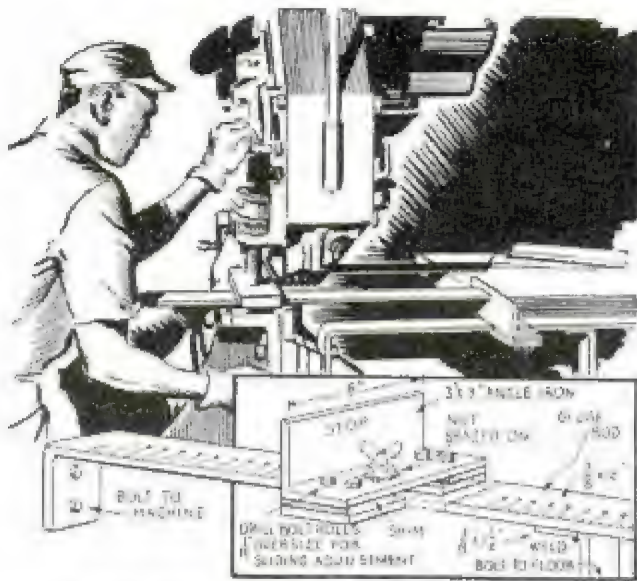
If holes rust through your exhaust pipe near the rear end and allow the fumes to heat the gas tank or escape into the car, you can repair it with a piece of flexible metal tubing. Get a piece that fits snugly inside the pipe and force it in place so that it extends well beyond the rusted part. Then strike the pipe sharply at various points to indent it slightly, thus pinching the tubing to hold it in place.



—Malcolm M. Smith, Elkins Park, Pa.



## Length Gauge for Shearing or Punching Machines



*This easily made length gauge helps obtain accuracy on a punch press, power shear or hack saw*

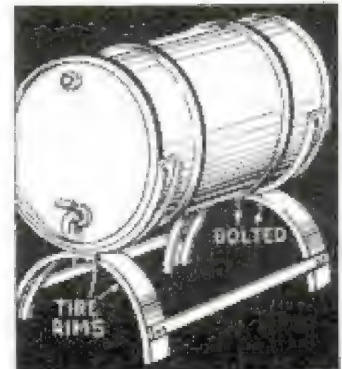
Useful on a power shear, this length gauge is also handy on a punch press or for use with a power hack saw. Made from a length of  $\frac{3}{8}$  by 2-in. flat iron, the gauge has a scale scribed in the upper surface,

and one end is bent at right angles for attachment to the machine, while a flat-iron leg is welded near the other end to support it above the floor. A sliding stop is made from a short piece of angle iron, which has small plates bolted to the underside and spaced with shim stock to obtain a snug, sliding fit on the gauge.

—Edwin M. Love, San Gabriel, Calif.

## Rigid Stand for Oil Drum

Farmers and others who keep drums of oil and gasoline on hand can make rigid stands for them from old auto-wheel rims. The rims are merely cut in half and bolted together as indicated, two horizontal braces of angle iron being bolted or riveted to the rims which serve as legs for the stand.



# The Next Issue

## GOOD BRUSHES FOR GOOD PAINTING

What the professional painter looks for when he buys a brush—what is meant by bristles with “flag ends”—picking the right brush for the job. How to “flow” varnish and how to clean brushes after you use them.

## FAMOUS “ROBERT E. LEE” IN MINIATURE

Simplified model of the winner of the historic steamboat race, which was run up the Mississippi river in 1870 at a speed of over 14 m.p.h.

## MODERN DESK HAS FLUSH CHAIR

With open shelves at one side and drawers at the other, this desk has a chair which slips compactly into it flush with the front side.

## PICTURE FRAMING IS EASY

How to cut moldings and assemble the frames regardless of shape. Also shows how to make various clamps to hold the frames for gluing.

## WOODTURNING LATHE

Easy to make, this lathe will handle light work in the home shop. It has a headstock and tailstock assembled from auto connecting rods.



# Swing High on Thrills



# Swing Low on Costs

## ...With a **HARLEY-DAVIDSON** Motorcycle

What a pack of thrills you'll get out of owning a Harley-Davidson! The minute you swing into the saddle your chest will swell in sheer pride over the streamlined design and nifty color scheme—built-in instrument panel and 120 m. p. h. speedometer dial. Then get set for more travel pleasure than you ever dreamed of because Harley-Davidsons sure swing high on riding thrills. They've got greater sustained horsepower, greater strength, easier handling, and give you a gliding ride that packs every trip with joys you'll long remember. What's more—you'll get a new and bigger thrill after every trip when you see how these improved models swing gas and oil costs way down to new lows!

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Check your age group.

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# Hot News on the Air

(Continued from page 373)

themselves were mystified at the moment.

They found out afterward what had happened. They were talking over a fourteen-party rural telephone line. Somewhere in Gary an operator, unconscious of the broadcast on the line, gave the telephone dial a couple of swirls and the clicking of that dial traveled along the wire to the studio and sounded on the air exactly like a burst of machine-gun fire.

In the big cities of America, news staffs of the radio chains and local stations are on the alert every minute to cover spot news. Bags are packed for instant action, complete short-wave transmitting sets are ready in suitcases, and engineers are awaiting the call to cut in remote transmitters on the nearest telephone circuit. The nearest telephone was not near enough when radio men were covering the Republican river floods in Nebraska in 1935, and the story you listened to had to travel over two or three miles of a farmer's barbed wire fence before it reached an electric line.

Organization is what gains the scoop for the radio chain—and ingenuity is what gets the radio reporter his story. To cover the coronation of King George VI in London, the most elaborate setup ever attempted was arranged. Forty-eight microphones were posted in Westminster Abbey alone, all pouring a flood of words through one control room for broadcasts to England and a second control room for foreign broadcasts. Forty engineers were on duty there. Besides, there were radio observers posted all along the route of the procession. When King Edward abdicated, Columbia's one special events man in London had to organize and direct broadcasts lasting from 8:00 a.m. to 2:00 a.m., New York time, for six consecutive days.

Radio used to depend on newspapers for news. Today they still cooperate, but radio covers the story "on its own"—and even gives the papers a lift occasionally. On last election night the Columbia news room in Chicago was converted into an election tabulation headquarters; direct wires brought in returns, stenographers tabulated them, writers and commentators gave facts and interpreted them, and telephone lines were kept open constantly to

the candidates and political headquarters. Unable to get access to Chairman John Hamilton of the Republican National Committee to solicit a statement, an Associated Press reporter called Columbia for help. He got it. The radio news room rang Hamilton on the direct broadcast wire to his room, and the Associated Press man got his statement.

During the Chicago stockyards fire some wild stories were going out on the air from studios too far from the scene to check the reports they received. A special events man tore down to the yards with his crew and in five minutes had the beginning of a true picture. Just as he arrived he met a company of firemen being relieved. They had been the first to reach the fire. The radio man beckoned them to a lunch counter with a five-dollar bill and gathered his story.

Here's what your boss, the special events man, will tell you when you join the staff as radio reporter:

"Be sure to tell **WHAT** happened—**WHERE** you are—**WHO** was involved.

"Names are more important in a disaster story than all the descriptive adjectives in the dictionary.

"Be concise, accurate, vivid. Make the event tell its own story. Question eyewitnesses. Interview principals. Give facts, not opinions.

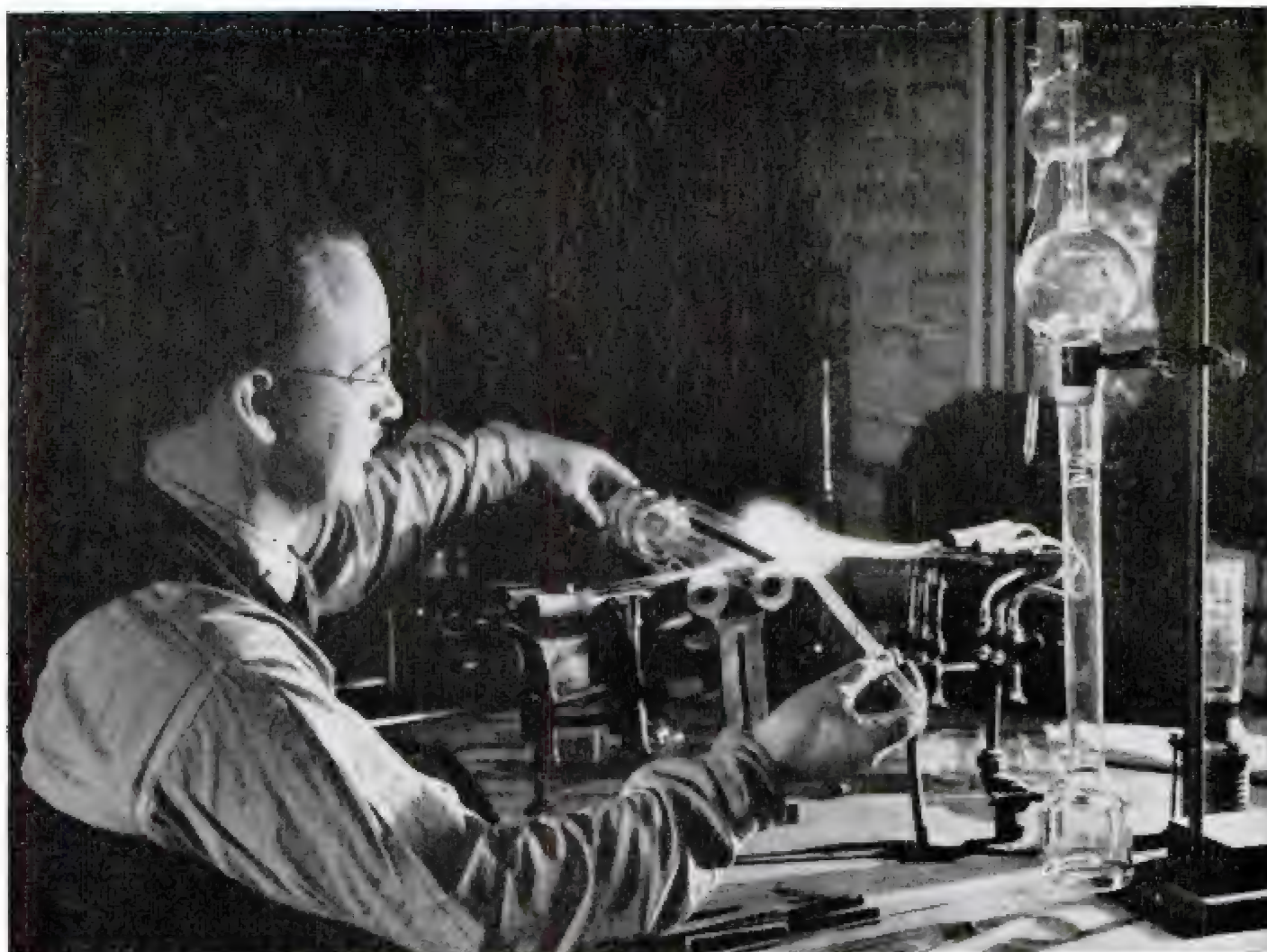
"Most of all, look for sound—vivid, authentic sound!"

## Likelihood of Tooth Decay Seen by Chemical Test of Enamel

Susceptibility to tooth decay can be determined by a five-hour test of finely powdered tooth enamel in the chemical laboratory. The method, announced recently to the dental profession, calls for the mixing of a carefully weighed amount of the enamel with the patient's saliva in a sealed test tube which is rotated for four hours in a water bath of body temperature. Then the enamel particles are separated and weighed again and the saliva analyzed for presence of calcium. If a person is susceptible to decay, the calcium content may be higher and the weight of the remaining enamel correspondingly less.

Announced by Dr. H. B. Allen





## Hands That Shape Modern Living

**S**KILLED hands that join glass and metal so that the human voice can reach millions of listeners. They first fashioned the high-power vacuum tube on a principle used today in every broadcasting station. They built the x-ray tube which has become an indispensable aid to the physician. They are the hands of craftsmen in the General Electric Research Laboratory, in Schenectady.

They are the hands that enacted much of the thrilling history of the tubes in your radio, of phototubes that outperform the human eye, of sodium lamps that make night driving safer on many American highways. Skilled and ex-

perienced, these craftsmen built the first models of many of the new devices which now play an important part in modern civilization.

Research combines the abstract genius of the mathematician, the ingenuity of the experimenter, the practical skill of the craftsman. Our whole American system is built on the co-operation of many hands and minds to translate the findings of science into an abundance of the necessities, comforts, and luxuries we all desire. More goods for more people—at less cost—is the goal of American industry. It is the goal toward which G-E research has made and is making significant progress.

*G-E research has saved the public from ten to one hundred dollars for every dollar it has earned for General Electric*

**GENERAL**  **ELECTRIC**



# Queer Facts about Gasoline

(Continued from page 413)

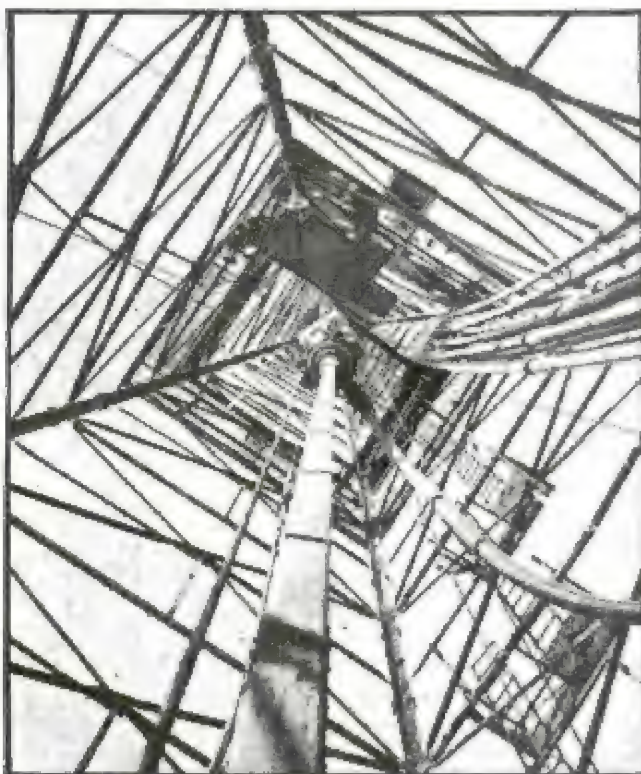
motor changes it will be possible to obtain something like one and a half times as much power from a gallon of this gasoline as can be extracted from a gallon of ordinary gasoline.

By combining large numbers of gas molecules into single units it is even possible to manufacture lubricating oils of extremely high oiliness. Benzene, toluene, xylene, and other aromatics used in making dyes are extracted out of the waste gases. Benzene may be converted into carbolic acid and toluene is an ingredient in

sults. Other products of the petroleum industry are used in making tar paper, linoleum, rouge, all kinds of creams and salves, pharmaceuticals, soaps, matches, candles, wax papers, and carbon black.

The refining discoveries that make these products possible are also removing far into the future the time when the world will exhaust its motor fuel supply. In the early days a barrel of oil yielded only ten per cent of its bulk in gasoline. In 1935 more than forty-three per cent of a barrel of crude could be converted into gasoline, and today the proportion is even higher. Last year cracked gasoline accounted for more than forty-six per cent of the fuel sold, while natural gasoline condensed from saturated natural gas produced another eight per cent. At the same time that cracking conserves petroleum by increasing the amounts of refined products that can be extracted from it, the process opens the door to extracting oils and gasoline from coal and oil shale. Coal alone yields twenty-five gallons of tar per ton, which in turn yields about eight gallons of high-grade fuel. One estimate is that the coal supply of the United States is enough to fill the gasoline needs of the world for 800 years. Something like 108 billion barrels of oil are stored away in domestic oil shale reserves, furnishing another important source of motor fuel.

These sources, however, will never be used while petroleum remains as cheap as it is today. No one knows how much petroleum remains in the world but shrewd geologists suspect that great quantities are apt to be found in zones much deeper than the present producing fields. One of the obstacles in the way of needling into such sub-cellar pools is the comparative delicacy of up-to-date drilling equipment. A drilling crew may lower more than 500 tons of casing into a two-mile well today, but in spite of its ponderous weight the drilling pipe is a fragile tool. Scaled down to a height of one foot, the three-inch pipe would be only  $1/4,000$  of an inch in diameter, yet with this comparative thread of steel the drilling crew is able to bore through solid rock more than 10,000 feet below. A deep well may cost thirty dollars a foot to drill, as much as \$300,000 for a well that may or may not produce a drop of oil.



Courtesy Union Oil Co.

*Looking up from bottom of oil-well derrick. Note lengths of drill pipe at right*

T.N.T. Resins from the olefins in the waste gases are being turned into whole new groups of plastics and rubberlike materials resistant to oils, acids, and alkalies. The synthetic rubbers are said to be superior to natural rubber for such uses as gasoline and oil hoses, printing press rollers, and lacquer spray hose. Soft core centers for golf balls and components for chewing gum are two other products. Automobile tires have been produced from the synthetic rubber in Russia. Because of their adhesive and waterproofing qualities some of the resins are being used by paint and lacquer manufacturers. Fast drying printers' inks and better house paints are the re-



# "I've got a weakness

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It may not be your age so much as your shaving methods that make you look older than you are.

That's why thousands of men, discarding old methods and switching to modern Barbasol, are able to shave years away from their faces. Better still, start using Barbasol young and stay young.

For Barbasol is a cream. It contains none of those harsh alkalis that tighten and draw and dry out the skin, resulting in wrinkles and roughness.

On the other hand, Barbasol contains soothing, refreshing



ingredients that leave your smoothly shaved jowls feeling softer, looking younger—a handsome Barbasol Face.

Ask your druggist for a tube of Barbasol today. Try it for two

solid weeks and see the wonderful improvement in your skin, the cleanness of your shaves. Large tube, 25¢; giant size, 50¢; family jar, 75¢. Five Barbasol Blades for 15¢.

*For modern shaving*



*No Brush—No Lather—No Rub in*

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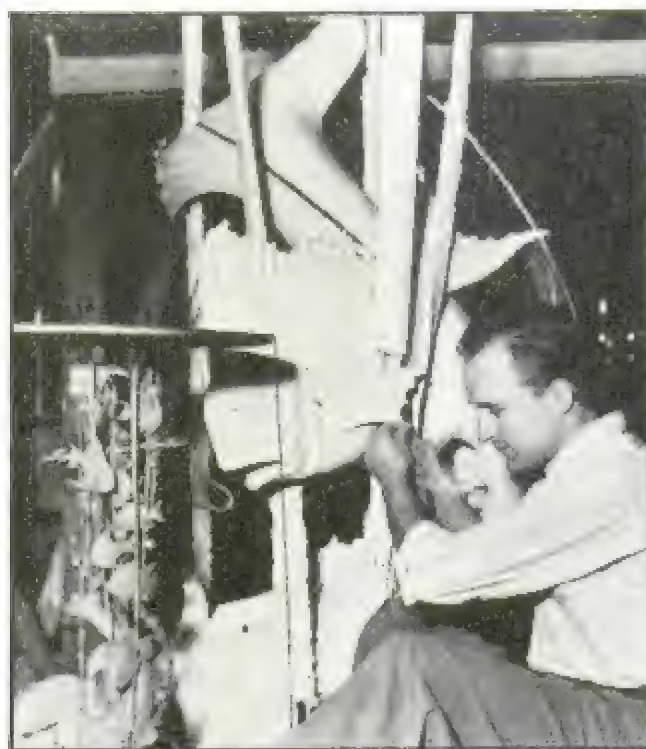


# Odd Jobs of Hollywood

(Continued from page 367)

with out-of-print volumes that were needed in pictures. When a studio needs a civil war newspaper or some printed military documents it turns to a Hollywood printer who specializes in turning out exact reproductions of domestic and foreign newspapers of various periods.

One collector has many thousands of dollars worth of early western relics ranging from frontier model revolvers to old stagecoaches and fire engines. The collection is rapidly paying for itself through movie rentals. Another man rents war medals to the studios, while still another



*Working on night club set used in Universal's picture, "Top of the Town"*

has a comfortable position manufacturing artificial flowers.

One of the major air lines has a "mock up" of a pilot cockpit and a passenger cabin, built to full size, that it is glad to lend to the studios merely for its name to appear in the picture.

Another peculiar profession is that of supplying animal actors for the movies. An untrained rooster rents for twenty-five cents per day, mongrel dogs are worth two dollars per day, but a trained animal that will do what it is told may earn a hundred dollars or so for a day's work. G. E. Orvedahl, once a sheep rancher in the Dakotas,

trained his dog into a faithful servant during a long illness. Today "Tuffy" is an accomplished actor and with his master on the sidelines to give him instructions, carries out commands in front of the camera. Dogs often make good actors and these days they must be especially trained for the sound pictures. Instead of responding to voice commands they must be taught to obey silent signals. Usually the training starts by giving the voice command and the signal at the same time. Gradually the voice is dropped. One trainer taught his dog to run at the drop of his hand, stop when the hand raises, and growl when the fingers are outspread. He uses a rubber ball in his outstretched hand to motion the dog forward or to one side. Some of the dogs, after rehearsing the same scene several times, actually learn to take their cues from the spoken words of the actors. A few of them respond to whistle signals that are pitched so high that the sound-recording equipment does not pick up the sound.

Lionel Comport, former studio property man who used to have trouble finding the right animal actors, decided to go into the business himself. Now his ranch contains dogs, chickens, pigs, and other domestic animals that have all appeared in pictures. His best moneymakers are two extremely swaybacked horses that are in demand for comedy work. A pet-shop owner rents out a trained crow that retrieves small objects with its beak. Another man rents out a flock of geese trained to waddle, honk, or stand quietly in front of the camera.

Hollywood has a number of character actors who get good pay when they are needed for portraying famous people in history. The casting offices have on hand the names of several who make good Napoleons and they are likewise able to phone for the living images of Washington, Lincoln, Caesar, and other famous characters.

Even a huge nose, a long beard, crossed eyes, or some other peculiarity is apt to get work for an extra when the script calls for such characteristics. Many of the best known circus freaks spend their winters in Hollywood because there is always a chance some studio may decide that it needs a bearded lady, a giant, or a family of midgets for a picture.



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# Men Against the Mountain Snows

(Continued from page 389)

the winter. Driving is dangerous for inexperienced motorists during mountain storms and the highway crews often hold traffic up until several cars collect, then escort them through dangerous areas.

Twenty years ago most automobile owners in the northern states stored their cars for the winter. Ten years ago snow removal in the cities and congested areas improved to a point where cars could be driven almost any time. But no one ever dreamed of making a coast-to-coast jaunt in the winter time except by a far southern route. Parts of the main transcontinental

The highway from Reno to Los Angeles, rising to elevations of 8,000 feet in the Sierra Nevada mountains, would be closed to traffic the first five months of every year if it were not for the steady fight against the snow. On 140 miles of this road snow is apt to fall as fast as a foot an hour, yet properly equipped cars can drive through with little delay. Last winter the road was closed only eight days, and usually the temporary gates are closed for even less time.

As soon as the snow fighters think the main storms of the winter are over they tackle another big job, that of clearing away accumulated snow that blocks roads to the high national parks and mountain resorts. By opening a road early the start of the vacation season may be advanced at least a month. On June 15, for example, you can drive through the Rocky Mountain National Park in Colorado at an average altitude of 12,000 feet. Officially it is summer but at times you will be driving on a narrow pavement between two high walls of solid snow. A week or so before you got there the national park crew had broken the road open for the first time since last year. Some of the snow, months old and almost as hard as concrete, weighs thirty-five pounds per cubic foot and must be broken up with dynamite. Then the auger blowers and plows can get to work on it.

Sometimes a freak snowstorm at the beginning of a winter season maroons vacationists by hundreds at resorts in the mountains. Then the snow fighters have a real emergency. Last winter thousands were caught in a blizzard that laid from three to five feet of snow in a few days on the high San Bernardino mountains not far from Los Angeles. In addition to fighting snow banks, fallen trees, and land slides day and night the snow-removal crew had stalled cars and traffic problems on their hands. Some resorts ran low on food. Telephone and electric-light wires were down but the highway department kept in touch with conditions with the aid of an amateur radio operator at the Big Bear Lake resort and another near their own headquarters.

(Continued to page 122A)



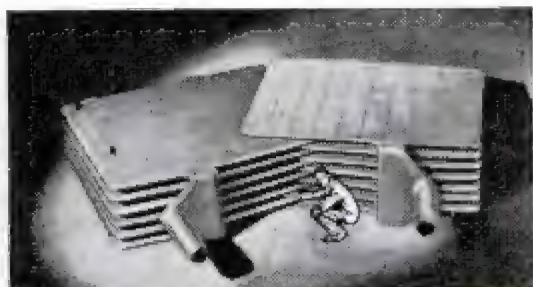
Courtesy California State Highway Dept.

*Railroad rotary plow on truck clearing mountain highway of snow*

highways, built at costs of up to \$15,000 per mile, were buried three months out of the year. Today people can drive clear across the United States in the winter with a minimum of delay and discomfort. Eventually, the snow fighters think, every main highway in the country will be kept open the year 'round. The Forest Service, the Bureau of Public Roads, and the highway departments of the states are co-operating on a larger and more efficient snow-fighting program each winter.



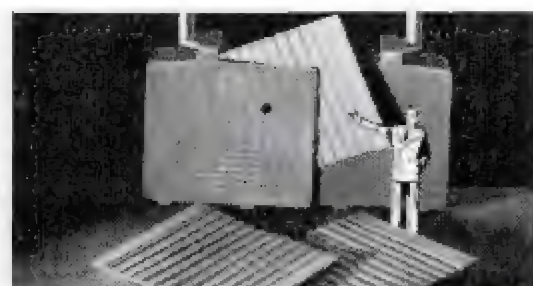
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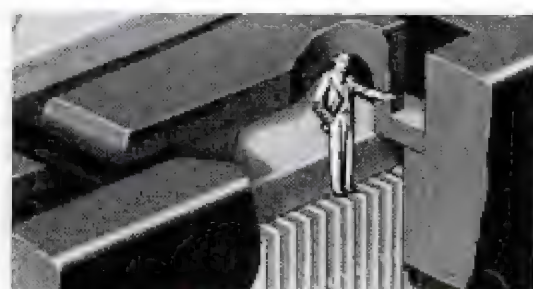
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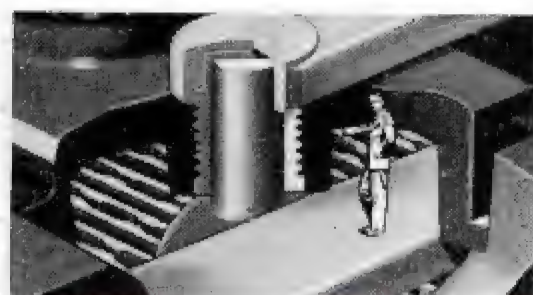
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12886

(Continued from page 120A)



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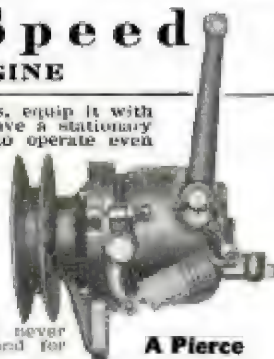
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Aside from food trucks that followed closely behind the snowplows no cars were allowed into the mountains until the road to every resort had been cleared and all outgoing automobiles had departed. Then the highway crews began clearing off huge parking lots for the swarms of motorists certain to arrive the next week-end for winter sports. When parking places aren't available the motorists park right in the road and then after dark a traffic jam five or ten miles long is the result.

Fighting mountain storms really starts early in the fall. While the summer sun still shines the highway crews begin erecting and repairing long miles of snow fences on the windward sides of the roads. These



Courtesy U. S. Bureau of Public Roads  
*Rotary snowplow throwing snow 150 feet down slope as it clears Berthoud Pass*

fences, made of closely spaced lath pickets, make the snow pile up and prevent it from drifting onto the roads. In some open areas the fences must be built twelve feet high. Lines of trees or shrubbery serve the same purpose. The latest idea in snow fighting is to make the wind do a lot of the work. When a new highway is planned the engineers map the road to follow exposed ridges and high ground in the mountain passes. This automatically reduces the height of the drifts that will pile up, and gives the wind a chance to keep the road free from snow by blowing it away as fast as it falls.

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## A New Age of Glue

(Continued from page 405)

starch can be made into paste. Cull sweet potatoes are the most widely used source of paper pastes. Today when you seal an envelope or lick a stamp chances are about twenty to one that the glue is made from sweet potato. The government is opening a paste-starch plant at Laurel, Miss., where cull sweet potatoes are used for making the two million pounds of mucilage which Uncle Sam uses each year on stamps and envelopes.

Just now glue makers are concerned with long-lived adhesives which are weatherproof and unaffected by swelling and shrinking of wood, glass, or metal. Milk or casein glues are among the first to meet these requirements. An average hundredweight of milk yields about three pounds of casein, along with four pounds of butterfat and about five of milk sugar. Removal of fat does not interfere with casein content and for this reason curd glues are of great benefit to the dairy and particularly the creamery industries. The casein is heated to form a firm curd which is washed, pressed and ground to flour. Treated with water this material makes an excellent paper paste and when treated with sulphuric acid it can be pressed and polished to make buttons, combs and other plastic products, also in making insecticides, cloth, imitation leather and washable wall paints for interior walls. Treated with alkaline filler, such as slack lime, it becomes a powerful adhesive, so strong that a timber will break sooner than its glued joints.

In general, hardwoods are most difficult to glue, while soft woods are easiest. As a rule, too, heartwood works better than sapwood. In joint strength redwood, western cedar, white fir, Sitka spruce, cypress, hemlock, white pine, elm, yellow pine, cottonwood gum and poplar rank comparatively low, while hickory, hard maple, persimmon, white ash, yellow birch, white oak, red oak, beech, walnut, Alaska cedar, and Douglas fir are comparatively high.

Glue research by the U. S. Forest Products laboratory staff indicates that seventy-five degrees is the best temperature at which to apply glue to wood, with seventy to ninety the extreme range for ex-

(Continued to page 125A)



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(Continued from page 123A)

cellent results. These experts also find that timbers difficult to glue are improved by a preliminary brushing over with a ten-per-cent solution of caustic soda dissolved in water, and wiping dry after about ten minutes. It also is important that wood surfaces be clean and smooth before gluing, and surfaces of old timber should be planed or sandpapered before glue is applied.

In ordinary indoor use the water content of wood is about seven per cent of weight. Dry wood out of doors has an average moisture content of about twelve per cent. The moisture content of wood for gluing should be such that when increased by the moisture from the glue it will be as near as possible to the moist content of the finished article. In gluing one-inch boards, moisture absorption resulting from gluing is about one per cent of the timber's weight. In making thin plywood and where the amount of wood is small in proportion to the amount of glue, moisture added to wood in gluing sometimes goes as high as forty-five per cent of wood weight. Therefore, in working thin strips of timber it is best to have the wood as dry as possible. Inch-thick or heavier timber should not be too dry. If very dry it is best to soak it in water for a few minutes.

Government experts estimate that for the best results under a wide range of conditions a glue spread of seventy-five pounds per 1,000 square feet of board, or one pound to thirty-seven square feet, is desirable. In working with glues which are not ready mixed it is usually best to apply about two parts of water to one of glue powder. The water should be clean and cold. To make a satisfactory joint it is important to spread an adequate amount of glue evenly and quickly over the surfaces to be joined. Hand spreading is practical for all except very heavy glues. Animal, liquid, thin casein, and liquid-blood glues may be spread by hand with ordinary bristle brushes. Wooden paddles or metal scrapers are best for spreading thick glues on small areas. Metal-bristle brushes are more durable and economical for spreading alkaline casein glues.

Among types of mechanical glue spreaders in successful use are double-roll

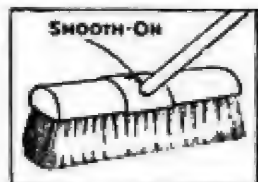
(Continued to page 126A)

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(Continued from page 125A)



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spreaders for spreading both sides of flat pieces; single-roll spreaders for one side or edge of flat pieces; perforated plates which rise vertically out of the glue for spreading edge surfaces; machines for squirting glue into dowel holes and lock-corner joints; and revolving brushes for spreading it into dovetail joints.

In gluing wood, pressure is required to bring the surfaces of the joint into contact, to force the air and excess glue from the joint, to spread the glue into a film of approximately uniform thickness, to force the glue into wood cells adjacent to the glue line to hold the wood into correct position until the glue sets, and to prevent warping. Well-glued joints may be made with pressures ranging from a few pounds, as that of rubbed joints, to 1,000 pounds or more per square inch. Good joints can be made with ordinary screw clamps or hand presses. Thirty minutes to an hour is usually sufficient pressure time for ordinary construction, with three to twelve hours for veneer and thin-wood construction.

Scientists of the U. S. Forest Products laboratory point out that the desirable properties of animal glues for woodworking include high strength in joints, quick setting, stainlessness and free-flowing consistency. They regard it as best for hand-spreading upon irregularly shaped joints. Casein glues are mixed and used cold and have high water resistance. When allowed to set they become entirely different in properties from the original mixture. Hydrated lime reacts with the casein to form a highly water-resistant compound. Copper sulphate or chloride or sodium fluoride, silicate or hydroxide are usually added to increase the working life of casein glues. Glues made from soybean or peanut meal are closely similar to casein glues. One of the most highly water resistant of all glue materials is blood albumin, which is in common use in Europe.

Experts recommend that in gluing end-grain surfaces, both surfaces should be sized with a mixture of one part of glue to three to five parts of water, depending upon the grade of glue, and the sizing coat should be allowed to dry. Both surfaces should then be coated with a thick glue mixture, about ten per cent less water than is used in side-grain gluing, and pressed at 200 pounds per square inch.



# THE GIRLS LAUGHED AT HIS SKINNY FORM!



**— till he gained 14 LBS. QUICK  
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**New IRONIZED YEAST  
gives thousands  
10 TO 25 POUNDS  
in a few weeks!**

**THOUSANDS** of skinny, rundown men and women who never could put on an ounce before have recently gained 10 to 25 pounds of solid flesh, new pep and popularity—in just a few weeks!

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Scientists have discovered that many are thin and run-down simply because they do not get enough yeast vitamins (Vitamin B) and iron in their daily food. One of the richest sources of marvelous health-building Vitamin B is the special yeast used in making English ale, world-renowned for its medicinal properties.

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ganic, inorganic and hemoglobin iron). Pasteurized English ale yeast and other valuable tonic ingredients are added. Finally, for your protection and benefit, every batch of Ironized Yeast is tested and retested biologically, to insure its full vitamin strength.

The result is these marvelous little Ironized Yeast tablets which have helped thousands of the skinniest, scrawniest people quickly to gain normally attractive pounds, natural development, peppy health.

## Make this money-back test

If, with the very first package of Ironized Yeast, you don't begin to eat better and to get more enjoyment and benefit from your food—if you don't feel better, with more strength, pep and energy—if you are not absolutely convinced that Ironized Yeast will give you the pounds of normally attractive flesh you need—your money will be promptly refunded. So get Ironized Yeast tablets from your druggist today.

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To start thousands building up their health right away, we make this absolutely FREE offer. Purchase a package of Ironized Yeast tablets at once, cut out the seal on the box and mail it to us with a clipping of this paragraph. We will send you a fascinating new book on health, "New Facts About Your Body." Remember, results with the very first package—or money refunded. At all druggists. Ironized Yeast Co., Inc., Dept. 539, Atlanta, Ga.

**WARNING: Beware of the many cheap substitutes for this successful formula. Insist on genuine Ironized Yeast.**



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professional  
models

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# Wire That Picture!

(Continued from page 395)

first plane for Albuquerque. From there, they dashed to McNary. Then, while the sound-photo engineer went on to Winslow where there were hotel facilities and set up his equipment, the photographer, through deep snow, made his way to the wrecked plane. He got his pictures and then fought his way to Winslow. Formerly on an assignment such as this, his job would have been only half done. But this time things were different. Instead of worrying about how to get his plates back to New York, he developed them right in Winslow and turned them over to the

may get his pictures into the paper is even greater. Telephones right to the ringside, the speaker's table or the reviewing stand make it possible to transmit photographs almost as rapidly as the eye-witness description of the event.

Sometimes the sound-photo machines are used in conjunction with other swift means of transportation to speed pictures from foreign countries, for the saving of only a few hours may mean a picture scoop and result in the additional sale of thousands of copies of newspapers. Such was the case when the civil war in Spain became a major news event. One of the first newspaper photographers to appear on the battle front was Horace Abrams, photographer for International News Photos. Despite censorship and other restrictions, he took pictures vividly showing the horrors of the war. But by the time he had returned to Burgos, Spain, other photographers had appeared on the scene and made pictures. Then it became a race to see who would get his photos to America first.

From his office in New York, Editor Harry Baker flashed this order to Abrams, in Burgos:

"Fly Paris—Put pictures aboard plane Cherbourg connecting with Empress of Britain sailing Quebec."

At Quebec, a sound-photo engineer dashed aboard the "Empress of Britain" and secured the precious photographs. A half hour later in his hotel room, he began feeding them into his sending apparatus. Throughout the country, at strategic points, receiving machines were hooked up to the Quebec telephone circuit. The drum of the sending apparatus began to revolve. The first picture was turned into sound waves and began going over the telephone lines. Throughout the country, the drums of the receiving machines began turning in perfect synchronization. In New York, Baker saw the first picture take form, . . . then another and another. A short while later the Abrams pictures were being printed in newspapers going to press in Los Angeles, New York, San Antonio, Chicago, and other cities where the sound-photo machines were in operation.

Just as International News Photos se-

(Continued to page 130A)



*Transmitting photo by wire. Note distance from phone receiver to sending machine*

sound-photo engineer who put them on the telephone wires immediately. They began coming into newspaper offices which had their sound-photo machines hooked up in the circuit faster than the swiftest airplane could have carried them."

Where important news events are regularly scheduled, such as champion prize fights, speeches by celebrities and parades, the speed with which the photographer

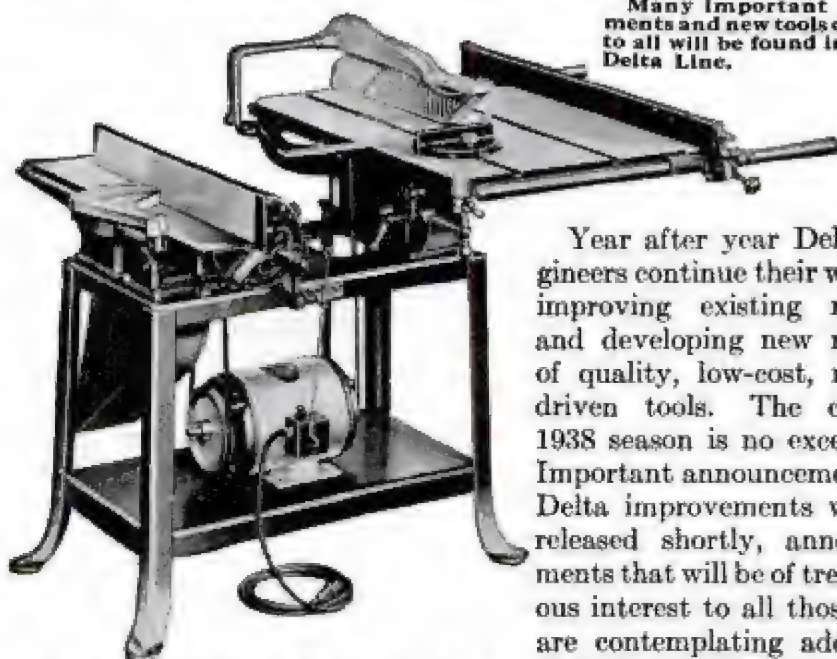


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## *will be out soon*

### New 1938 Line to Be Announced Shortly

Many important improvements and new tools of interest to all will be found in the 1938 Delta Line.



The New Delta 16-inch Circular Saw, shown in the illustration above in combination with the new Delta 6-inch Joiner, is the largest, best and most completely equipped circular saw yet offered for the home work shop, tool shop, pattern shop, contractor and builder. It has numerous exclusive features that make it the season's outstanding tool.

Year after year Delta engineers continue their work of improving existing models and developing new models of quality, low-cost, motor-driven tools. The coming 1938 season is no exception. Important announcements of Delta improvements will be released shortly, announcements that will be of tremendous interest to all those who are contemplating additions to their shop. Before selecting new tools—be sure to see the 1938 Delta Line.

## SEND COUPON TODAY!

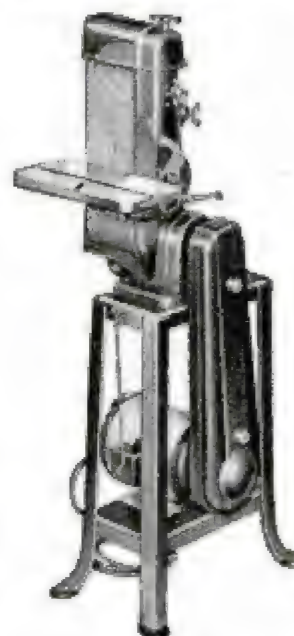
### So Your Name Will Be on Our Mailing List

The new 1938 Delta Catalog will be off the press soon. It will contain full description, illustrations and photographs of the complete Delta Line, including the many new Delta Tools with improvements incorporated in the 1938 line.

Every man interested in low-cost, quality tools should see the new Delta Catalog. In order to make sure that your name will be placed on the mailing list to receive a copy, send the coupon below today. At the same time enclose only 10c for the new 1938 book of "Practical Delta Projects," Book No. 4 containing 32 pages of new and novel things to make, with many blue prints, working drawings, photographs, illustrations—and complete directions. Be sure to mail the coupon at once.

#### New 1938 Project Book

Now out, the new 32-page book No. 4 of "Practical Delta Projects"—crowded with new and "out of the ordinary" things to make — with many photographs, working drawings, and easy-to-understand illustrations. Simple, complete instructions make every project easy to follow. Every woodworker should have this book. Send 10c with coupon. 1938 Delta catalog mailed postpaid.



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I enclose 10c (stamps or coin) for which please send me one copy of the new 1938 Book No. 4 of "Practical Delta Projects." Also place me on your mailing list to receive 1938 Delta catalog of quality motor-driven woodworking tools.

Name.....Age.....

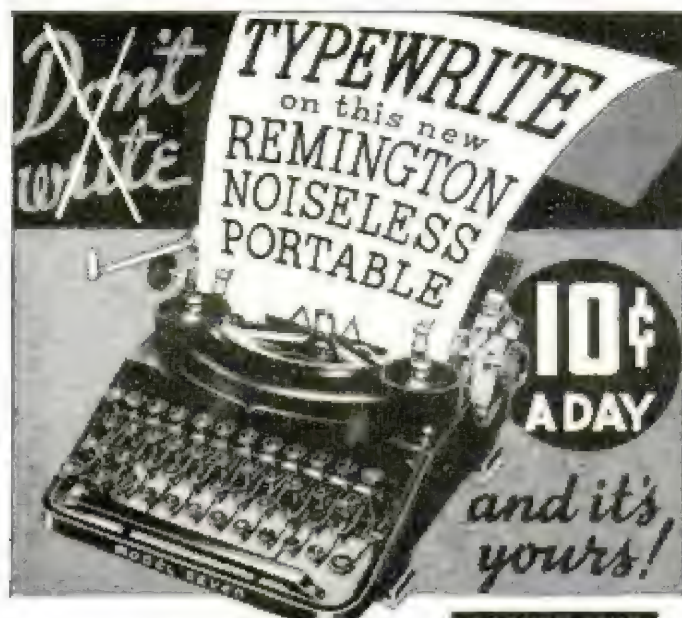
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(Continued from page 128A)



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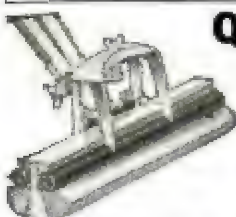
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cured a scoop with the rapid distribution of the war pictures, other photo services with devices for sending photos over wires have scooped one another by means of adroit planning. When the first flash of the appalling school disaster at New London, Tex., reached the New York office of Times-Wide World, a photographer at Dallas was ordered to charter a plane and fly to New London to take pictures. In New York and in St. Louis, photo transmitters and engineers were put aboard chartered planes with orders to intercept the camera plane wherever it might be, after the pictures had been made. The plane from St. Louis reached the photographer first, contacting him near Tyler, Tex., while he was flying back to Dallas with the pictures. Both planes came down. The transmitter was hooked up with the nearest telephone circuit while the photographs were developed on the spot. Then six photographs of the disaster were wired to New York and other large cities. The first flash of the disaster had been received shortly after 5:00 p.m. on Thursday night.



Here is the picture delivery station in office of International News Photos

On Friday morning, readers throughout America opened their newspapers and saw, in pictorial form, the tragedy which had taken the lives of hundreds of school children.

When the recent flood story broke, the Associated Press had a picture-sending machine in a New York laboratory for research purposes. There was no time to put it together, so Harold Carlson and J. C. Barnes put the dismantled set on a plane

(Continued to page 133A)



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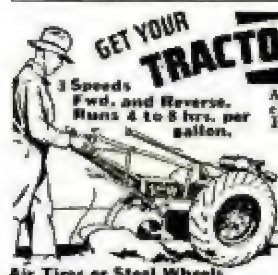
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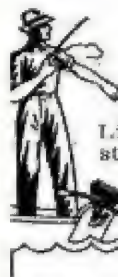
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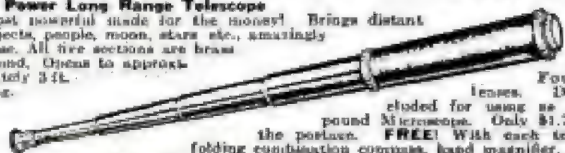
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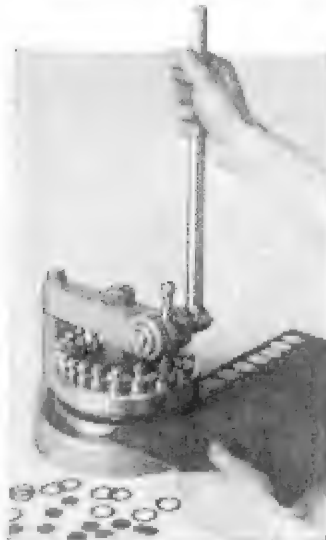
(Continued from page 130A)

and flew to Pittsburgh. While photographers were taking pictures, the two experts assembled the machine by the light of a candle. When the pictures were ready, the sending set, operated by means of an automobile storage battery, was hooked into the 10,000-mile "Wirephoto" circuit controlled by the Associated Press. Soon newspapers throughout the country began receiving the first of nine pictures graphically showing the ravages of the flood.

"Every day the potentialities of wired photos appear greater," states Editor Baker. "Today even the sending of photographs in natural color over telephone lines is practical. Recently we sent a picture of a movie star in full color from Hollywood to New York. Wired picture transmission has created a new industry which offers many opportunities. Already many technicians in the radio field have entered the new profession. There is room for more. There are still some kinks to be ironed out and experimental work to be done by ambitious young men. Every day the order to 'Wire that picture' is assuming increasing importance."

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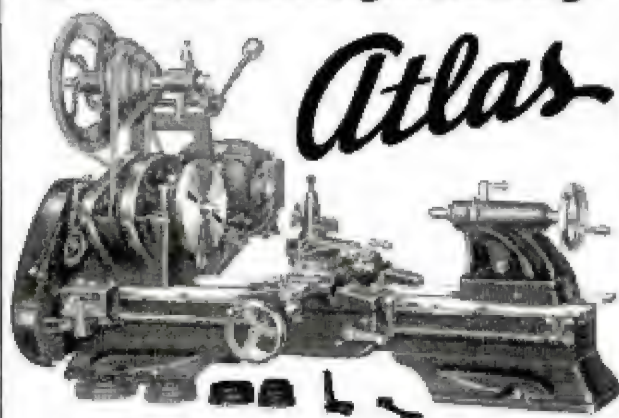
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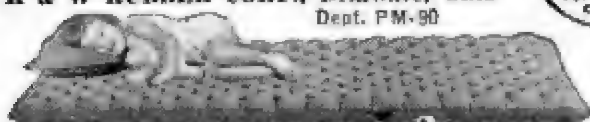


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**K & W RUBBER CORP., Delaware, Ohio**  
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## Around the Corner in Aviation

(Continued from page 380)

it goes into service before the end of 1937.

Sikorsky, who has done much research in wing loading, foresees that it will soon be raised up to forty pounds per square foot. Tomorrow's fifty-five and 100-ton transports may be expected to be quite stable in stormy weather.

For more than ten years aircraft engineers have been studying the possibilities for larger commercial transports. The multi-engined "DO-X" was a colossus, but did not live up to expectations. For the time being, designers have definitely receded from the idea of having as many as twelve engines. A reduction in the number of engines is now made possible by the recent increase in horsepower. Within the



France's huge flying boat which is reported able to transport a load of nineteen tons

next five years we may see aircraft engines weighing less than one pound per horsepower. Fuel consumption will be reduced to thirty-five hundredths pound per brake horsepower per hour, as compared with fifty hundredths or forty-five hundredths pound at present. Liquid-cooled engines will also be much improved.

Besides the "DO-X," which has been retired from active service, another outstanding giant experimental plane was the "Maxim Gorki," built in Russia. It met with disaster when it collided with a small airplane. The largest heavier-than-air craft now operating is the "Lieutenant Vaisseau" of Paris whose gross weight loaded is 81,400 pounds. It weighs thirty-seven tons unloaded. This transport crossed the South Atlantic ocean once and

(Continued to page 136A)



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**TWICE THE HEAT AT LESS COST—NO DIRT OR ASHES**  
**QUICK HEAT AT TURN OF VALVE**

An Amazing New-Type Oil Burner Which Experts and Users Say BEATS ANY EVER GOTTEN OUT FOR LOW COST, PERFECT PERFORMANCE, Burns Cheap Oil a NEW WAY Without Pre-generating or Clogging Up, Cuts Fuel Bills in Half and Pays for Itself Quickly by What It Saves. READ BELOW HOW YOU CAN TEST THIS REMARKABLE SUPER FLAME OIL BURNER in Your Own Home or Business FREE OF RISK. Then Mail Coupon.

## COOKS A MEAL for LESS

Why burn coal or wood with its dirt and drudgery of building and feeding fires? Why carry ashes and get uneven, slow-starting heat, when you can burn cheap oil a NEW WAY and get TWICE THE HEAT at LESS COST—and have QUICK HEAT regulated to any degree desired by a simple turn of a valve?

Your present coal or wood stove, heating stove or furnace can be fitted easily and quickly with our Super Flame "HEAT KING." Thousands have acclaimed it the most perfect oil burner. Nothing like it ever on the market—the lowest priced efficient oil burner—Positively guaranteed NOT TO CLOG, NOT TO CARBON OR STOP UP. The only oil burner that has a record of over 11 years constant use without ever needing any cleaning. Simple—safe—economical—no electrical connections—no moving parts to wear out—all unnecessary parts eliminated—does better work at less cost. Burns 95% air and 5% cheap oil and the result is TWICE THE HEAT OF COAL by simply turning valve. What an Engineer of National Reputation Says:

Combustion principles of the Heat King are simple, efficient, excellent—assures economical

oil consumption and maximum amount of heat. Tests made on burner with one year's hard service prove there was no evidence of dirt or residue within the burner or any carbon deposit on any interior parts. There are no nozzles or tips to "coke up" or stop up with sediment, scale, etc.—J. W. Lovelace—E. C. Mo.

### WHAT USERS SAY:

There are fifteen oil burners of different kinds here but Heat King is cheapest and best—J. R. Goldthorp—Washington.

I get more heat from your burner than I ever had from coal, wood or anything else I ever burned in my furnace—W. C. Nicholson—Ind.

My wife and her mother say they have reduced their coal bill fifty percent since they put your oil burner in—W. S. Collins, Pa.

Your oil burner is the poor man's friend—L. Grady—N. C.

### TRY AT OUR RISK—30 DAYS TRIAL

If you want to SAVE MONEY in cooking and heating you may try the "HEAT KING" AT OUR RISK—Prove that it ends drudgery and dirt of coal or wood, cuts fuel bills in half, pays for itself quickly by what it SAVES. You must be satisfied under our liberal guarantee or YOU PAY FOR THE BURNER ABSOLUTELY NOTHING.

## AGENTS SALESMEN DISTRIBUTORS—BIG MONEY

Startling low price puts this amazing new-type oil burner within the reach of everyone. No wonder so many homes, small business firms, oil filling stations, etc., are buying it—no wonder salesmen and distributors are breaking records in sales. All YOU have to do is to bring it to the attention of prospects and show how it gives QUICK HEAT, HOTTER, CHEAPER, WITHOUT DIRT AND ASHES, and how it quickly pays for itself by what IT SAVES—then, reap BIG CASH PROFITS. It sells fast because low-priced, cheap to operate, efficient.

### WHAT SALESMEN SAY:

Gladly pleased with installations. Installed one when weather was 10 degrees below zero. Kept

house well heated and owner is still raving about the wonderful burner. I can dispose of 250 "HEAT KINGS" before this year ends—F. Silver—Canada.

Demand for oil burners is great. Have fifteen salesmen starting. Would like to turn out 250 burners a week—C. A. Pierce—N. V.

Heat King satisfactory in demonstration to one of the largest oil companies—W. DeJesters—Ohio.

I am a plumber, have installed all kinds of oil burners, but I never knew before there was such a thing to get that much heat out of oil. There is money in selling them—W. C. Nicholson—Ind. If you want to DOUBLE and TREBLE your earnings and own your own business, you can't beat the "HEAT KING" as a money maker. Get YOUR OWN OIL BURNER SAMPLE AT NO COST and CASH IN BIG PROFITS. Act quick—be FIRST in your locality—MAIL COUPON at right or 1c postcard today—NOW.

UNITED FACTORIES L-751 Factory Building Kansas City, Mo.



**Slips Into Any STOVE RANGE or FURNACE**

**—QUICK HEAT on or off AT TURN of VALVE**

**FREE SAMPLE to Agents**

and salesmen offered to one energetic man or woman in each locality who will demonstrate and take orders. Send no money—just sign and mail coupon (or 1c postcard will do). You can't lose for here's a revolutionary cheap new type oil burner that is safe, economical and efficient. So mail coupon quick, be first in your locality to learn how satisfactory oil heat can really be and how you can MAKE REAL MONEY spare or full time. Mail Coupon or 1c postcard today—NOW.

## MAIL COUPON

UNITED FACTORIES, L-751 Factory Building, Kansas City, Mo.

Without cost or obligation, rush generous TRIAL OFFER on the wonderful "HEAT KING" Oil Burner sent WITHOUT RISK TO ME.

Name.....

Address.....

City.....

State.....

☐ Check here if you also want to know how to make money in sales agency of your own and get NO COST SAMPLE. This does NOT obligate in any way.





Make new or old buildings more attractive and waterproof. Plastic COLORCRETE fuses with any masonry surface. It fills all cracks. It can be sprayed in any thickness and in 30 colors. Fully proven by over twelve years actual use under all conditions and every climate.

Owners everywhere want to enhance values. You can supply this big waiting market with permanent COLORCRETE at amazingly low cost.

Offers big earnings. Operators report costs of 2c and up per sq. ft. and sell up to 7c. Some have paid for their equipment from first few jobs. Machine capacity up to 1,000 sq. ft. per hour.

Get the facts. Send for book "Proven Business Opportunity". Write today. It offers big extra income.

COLORCRETE INDUSTRIES, INC.  
570 Ottawa Ave. Holland, Mich.

With this machine



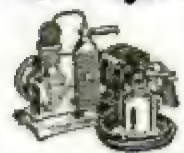
## ALL-PURPOSE MOTO-TOOL

Does many jobs speedily, easily—grinds, drills, engraves, sharpens, routs, carves, polishes, etc. Universal motor—about 20,000 R.P.M.—plugs in any light socket A. C. or D. C. Handles as lightly as a pencil. Weighs 6 oz. and is amazingly powerful. Oilless—self aligning—ball thrust bearings.

TEN DAY TRIAL, satisfaction guaranteed or money back. 20 pc. general utility tool set \$5.75 extra. Send for Free Booklet.

DREMEL MFG. CO., 2821-Ct., Racine, Wis.

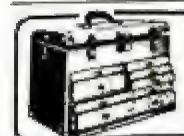
## NEW Light Weight Paint Sprayer—Only \$31.15



1/4 H.P. Motor AC110 Volts. 60 Cycles. COMPLETE

Quick, easy way to paint screens, furniture, radiators, machinery—anything—in homes, factories, stores, schools, hospitals, office buildings, etc. Small, compact. Carry anywhere. Weight 44 lbs. Complete with Spray Gun; 15 ft. Hose. FULLY GUARANTEED. Only \$31.15 f.o.b. Chicago. \$5.00 Deposit, Balance C.O.D., or see your dealer. Free

Circular. Ideal Pump Co., Dept. P-9, 501 Washington St., Chicago, Ill.



## A LIFE-LONG FRIEND!

Gerstner Tool Chests will hold the good will of any machinist and toolmaker for life. Choose yours from Free Catalog.

GERSTNER TOOL CHESTS

463 Columbia St.

Dayton, Ohio

## DIESELECTRIC PLANTS

### MAKE YOUR ELECTRICITY FOR 1c PER KILOWATT

Make your own electric light and power the "Diesel Way" with WITTE Dieselectric Plants, 1000, 3000 or 6000 watts, for Less Than ONE CENT per KILOWATT on cheap non-explosive fuel. 110 volt A. C. or D.C. for direct lighting, 32 volt for battery operation. Charging costs lowered 75%. Easily installed in small space. Also stationary Diesel Engines 3, 5 and 10 H. P. Use a Diesel for Economy and Safety.

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\$565

and up  
F. O. B.  
K. C., Mo.



1600  
Watts

Easy Payment  
Plan

Kansas City, Mo.

## WITTE ENGINE WORKS

(Continued from page 134A)

flew north to Miami, where she capsized but was salvaged.

What is believed to be the greatest heavier-than-air craft now building is the "DO-20" under construction by the Dornier company, designers of the "DO-X." The "DO-20" is an eight-engined monoplane and will have fifty-eight tons gross weight. It is reported that Pan American Airways has contracted for six forty-one-ton clippers with the Boeing company. These will be about fifteen tons heavier than the "China Clipper," the largest flying boat constructed in America to date.

The famous "Brazilian Clipper," which set numerous flight records, weighs nineteen tons. The Douglas "DC-2" weighs about nine tons loaded.

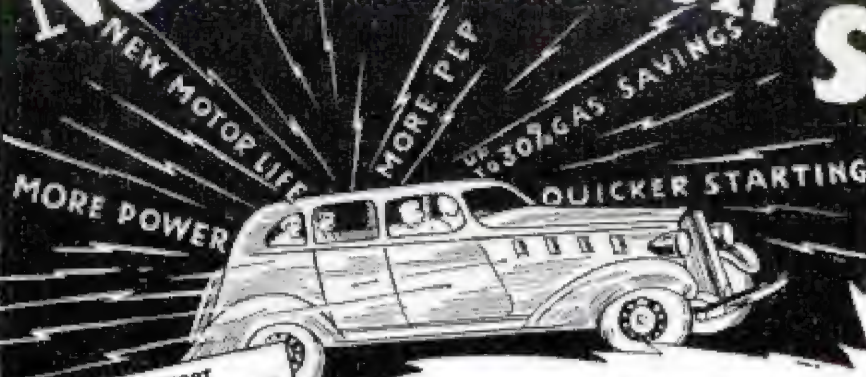
It appears that present-day transports are pigmies compared to what can now be built with available knowledge and materials. Both Sikorsky and Martin hold that a million-pound, thousand-passenger sky transport could be built. Such a vessel could cross the Atlantic in twenty-four hours. "But," says Sikorsky, "a 500-ton ship would naturally reduce the frequency of schedules. So I do not look for such sizes. I do, however, predict land planes and flying boats of fifty to 100 tons within the next five years."

Sikorsky also foresees the boosting of speeds thirty to fifty miles an hour, establishing an ultimate practical operating speed of 200 miles an hour for flying boats and 250 miles an hour for land planes. Here again practical considerations, rather than engineering limitations, are foremost. At present, there is no good reason to have flying boats that travel five or six times faster than ocean greyhounds, or to have land planes that travel more than three or four times the speed of express trains. After 200 and 250-mile-per-hour speeds have been attained, designers would give attention to more passenger comfort. High-lift devices and smaller engines with less cooling drag will reduce operating costs and increase comfort.

Small diameter engines with wing radiators or blower cooling should enable transports to make the same speed with about thirty per cent less power. The direct operating cost per ton-mile of payload for tomorrow's airplane is figured conservatively at twenty-three cents.



# New Invention WITH SUPERCHARGE PRINCIPLE SAVES GAS



**USERS REPORT**  
**3 to 7 MILES MORE PER GALLON**  
**MOTORIST SAVES \$189.00 a YEAR**

"On my V-8 Ford it works miracles. Its added power, acceleration and top speed has sold me. The results are unbelievable."—Ralph Fiddi, Mass.

"Very glad to say, the Buick showed an increase of 5 miles more per gallon."—A. P. Green, Washington.

"On my Plymouth, I obtained an average of 23 miles per gallon, an increase of 7 of 13. This means a saving of \$15 a month or \$180 a year."—F. S. Peck, Calif.

"It saves me one gallon a day. I had to buy 5 gallons each day—now only 4 gallons."—L. P. Swart, Pa.

"I have twelve VACU-MATICS on cars now, and they all show an increase in mileage. The car owners are very well pleased."—Fred Taylor, Ohio.

"I have been placing VACU-MATICS on expert mechanics' cars. All are well pleased."—J. W. Desautel, W. Va.

## Guaranteed Gas Savings

VACU-MATIC proves itself on every car. It is guaranteed to give worthwhile gas savings, quicker pick-up, and more power or it costs you nothing. You can instantly tell the difference in added power and motor performance — you quickly notice the cash savings on gasoline.

## Fits All Cars

VACU-MATIC is constructed of six parts, assembled and fused into one unit, correctly adjusted and sealed at the factory. Nothing to regulate. Any moment can attach VACU-MATIC in ten minutes. Once in, its only reminder is the surge of instant power and speed it gives to the motor and the savings it affords your pocketbook.

## AGENTS & SALESMEN

VACU-MATIC offers a splendid opportunity for unusual sales and profits. Valuable territories now being assigned. Check and mail coupon.

## Free Details

You owe it to yourself to know all about this remarkable discovery. Mail the coupon below. Start saving gas with VACU-MATIC and enjoy a new driving thrill! There's no obligation — to get the facts now! Write today!

The VACU-MATIC Co. Wauwatosa, Wis.

AT LAST! Automotive engineers have smashed down the barriers to perfected combustion! The new VACU-MATIC solves the secret of greater power! With almost magical action, this amazing invention instantly puts new life and pep in any motor. It adds mileage to every gallon of gasoline... produces split-second pick-up, sensitive accelerator response, quicker starting, greater speed and smoother running.

## Automatic — Nothing Like It!

The self-starter — four wheel brakes — knee action — streamlining... and now VACU-MATIC! The sensational money-saving invention! With it, engineers have achieved a practical means of balancing air and gasoline automatically for all speeds.

VACU-MATIC is *entirely different*! It operates on the supercharge principle by automatically adding a charge of extra oxygen, drawn free from the outer air, into the heart of the gas mixture. It is entirely AUTOMATIC and allows the motor to "breathe" at the correct time, opening and closing automatically as required. No idling troubles — no carburetor adjustments necessary. It is so simple it will amaze you — so practical it will save you many dollars on gas costs.

## FREE OFFER COUPON

### THE VACU-MATIC COMPANY

7617-324 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the VACU-MATIC and details of your Free Offer. This of course does not obligate me in any way.

Name.....

Address.....

City.....State.....

☐ Check here if interested in selling proposition

## TWO BIG LEADERS GENUINE LEATHER TIES

NO SALES EXPERIENCE NEEDED. Beautiful 4-in. Bands for Men and Boys, and an eight. LOOK LIKE \$10.00, dressed with a sharp cloth. Famous Century Boys and Men in uniform, such as policemen, firemen, labor unions, etc. Write today or send \$5 for samples, 4-in. Band Tie and Social Security Holder.

Inquire about our new **SOCIAL SECURITY HOLDERS.**  
Gold stamped; fast seller

**CENTURY TIE CO.,**  
2345-L, West Grand Boulevard, Detroit, Mich.

## HOMEBUILT WINDCHARGERS



Wind Propelled Auto generators 6-12-32 Volt. For Lights, Radio, Motors and Battery Charging. Send 25c for copyrighted booklet "Over 100 Facts and Plans" gathered after three years research. Wind Power is Free. Use it.

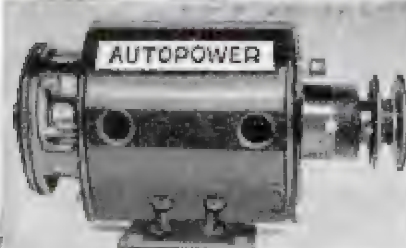
**CURRIER MFG. CO.** 422 Terminal Minneapolis, Minn.

## Catch Fish!

Bels, Mink, Muskrats, with our new folding galvanized STEEL WIRE TRAP. Write for our FREE TRAP OFFER and Bargain Catalog. \$1 Box of our famous Fish Bait FREE to introduce our traps. **WALTON SUPPLY CO., 3501 JUNIATA AVE., ST. LOUIS, MO.**

## Men & Women Earn Cash at Home!

Raise giant Patented Mushrooms! We supply materials, instruct with pictures, & our 25 branches buy all crops. Big FREE hook, photos, tell if your cellar, shed, barn, etc., suitable. Write today. Est. 1905. **UNITED CO., 3848 Lincoln Ave., Dept. 301, CHICAGO**



## TURN SCRAP INTO MONEY

AUTOPOWER tells you how in plain, easy, simple and illustrated instructions that anyone can follow. Change auto generators into useful, practical A C and D C generators and motors with voltage from 2 to 1,000 volts, for power, light, welding, radio, sound, etc. No previous experience nor special tools needed. Generators can be driven by wind, water, fan belt, etc. Already used and endorsed by thousands. Send for your copy of "AUTOPOWER." Only \$1.00 postpaid.

**S. W. Duncan, Publisher.**

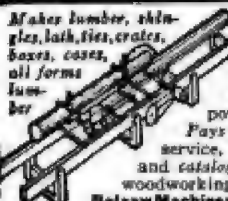
410 S. Hoyne Ave., Chicago

The new Sensation in auto polish—rich in color—smooth as velvet—hard as glass—preserves and restores finish for old and new cars—the color was to match the color of your car. They said: "It couldn't be done!" A color to match the color of your car? A polish to restore the color of a faded car? They said it was "Bunk". But here it is! A revolutionary auto wax in colors to match the color of the car. The most sensational development since the introduction of lacquer. Made in six colors. Color desired mailed for 75c. **Kota Kolor Wax, Forestoria, Ohio.**

The **COLOR** is in the **WAX**



## ONE-MAN SAWMILL



**TURN TREES INTO MONEY WITH A BELSAW**

Three capacities: 10, 14 and 20 ft.

Accurate set works positive dogs.

Full or one way type power feed runs on low power—Many owners use old auto engine.

Pays for itself quickly—thousands in commercial service, everywhere. Write for free lumber handbook and catalog of mills, supplies, tools, saw tables, and woodworking equipment.

**Belsaw Machinery Co., 8110 H Davidson Bldg., Kansas City, Mo.**



## BUILD THESE PROJECTS

For garden or lawn. Easy to build. Rear board. Detailed Blueprints Model D-25 Dutch Windmill 30c; Model CH-60 CH Model \$1.00. Lawn Figure Patterns—Amplified CHL Dutch Boy Teller Girl Holland Girl 35c each. 4—\$1.00. Catalog illustrating over 25 models, send 10c, today.



**CRAFTSMAN'S MODEL CO. Dept. P-9, 2630 N. 41st St., Milwaukee, Wis.**





**Can You Equal This Home for 952**

**Shipped Direct from Our Mill**

**Save 30% to 40% on Your New Home..**

**WE PAY FREIGHT**

Don't pay several hundred dollars more than necessary when you build a home! Buy it direct from our mill at our low factory price. We ship you the materials—lumber cut-to-fit, ready to erect. Paint, glass, hardware, nails, etc., all included in the price—no extra charges. We pay the freight. Plans furnished—also complete building instructions. No wonder our customers write us that we saved them 30% to 40%, compared with builder's prices. Easy terms—3 years to pay.

**Handsome Big CATALOGUE FREE**

Pictures wonderful homes in colors at money-saving prices. Designs to suit everyone. Write for your catalogue today.

**LEWIS MANUFACTURING CO.**  
Dept. 1279 Bay City, Michigan

*Send for FREE BOOK of Liberty Homes*

**HALF AND HALF  
MAKES ONE SWELL SMOKE!**

**TRAILER** ★ **BUILDERS**  
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**SEND 25c TODAY**

For new 1937 Trailer Builders Manual and Catalog. Tells how to build Traps, Beds, Cabinets—all about Electric Lights, Water Systems, Floor Plans, etc. Pages of valuable ideas and suggestions for Trailer Builders, Buyers and Owners. Catalog illustrates and describes largest line of Trailer Furniture, Supplies and Equipment in America! Everything is here—over 600 items—Aides, Benches, Hatches, Pumps, Stoves, Mattresses, Sinks—everything from wheels to top at lowest prices! Rush 25c today! Satisfaction Guaranteed!

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**Save One Half!**

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**CENTRAL Camera Co. (Est. 1899)**  
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Nearly 900 Styles and Sizes of Stoves, Ranges, Furnaces at Factory Prices. Easy Terms—no little as 12c a day. Up to 18 mos. to pay, if you wish. 30 Days Trial. 24 Hour Shipments. Write today for this FREE CATALOG. Over 1,200,000 Satisfied Users. 37 Years in Business.

**Kalamazoo Stove & Furnace Co., Mfrs.**  
391 Rochester Ave.  
Kalamazoo, Michigan

**"A Kalamazoo Direct to You"**

**FREE CATALOG**

## es 661 Tracking Crooks

(Continued from page 351)

flicting a wound rubs off microscopic quantities of lead onto the tissues. Out of this fact, Harper and Pinker have evolved a startling new technique.

A dead man is found lying by the roadside, a bullet hole in his forehead. Although the bullet itself is lost, the autopsy surgeon cuts a bit of tissue from the wound, turns it to ash, and gives it to the spectro expert for analysis. The precious bit reveals traces of lead, antimony, tin, bismuth, and certain characteristic impurities. Soon the police dragnet rounds up three suspects, each with a revolver in his possession. The three guns are tested and bullets from one gun betray the same tell-tale impurities as the wound tissues. Immediately two innocent men are released and the third finds himself revealed as the murderer.

In a recent case, ash samples from a bullet wound showed traces of copper and nickel, but very little lead. "Reconstruct-



Microscopic study of burglar's tools yields tiny bits of material for spectro analysis

ing" the missing bullet, experts told the detectives they might as well rule out all soft-nosed, regulation bullets, and look for a gun firing copper-jacketed ammunition. The gun actually causing the death was eventually found to have been loaded with .32 nickel-plated, copper-jacketed bullets.

A further addition to the spectro man's bag of tricks is a rotating sector like a flat-



2566  
tened pencil which periodically cuts off the center of the light beam. The vertical lines on the spectro film are thinned and dwindle to nothing at the center. The wider this gap, the weaker each ingredient. In this way an accurate quantitative assay can be made in a few minutes.

A prowler is picked up by radio police, who find a kit of tools in his car. "I'm an auto mechanic," he protests, but the officers believe the outfit is really a set of burglar tools. He resembles a known bank robber and among his tools is a steel drill point to whose spiral grooves cling tiny fragments of metal. Detectives visit a recently robbed bank, get permission from startled officials to drill a small hole in the mutilated safe's door, and give the two sets of shavings to laboratory experts for quantitative analysis. All steels contain much the same ingredients, but in different proportions. The two spindly sets of lines upon the spectro negative taper at the middle at exactly the same place—proof that it contains exactly the same proportions of certain hardening alloys as have been used to impart hardness to the vault's steel. There is no possible alibi to explain away this damning evidence—and the cracksmen confesses.

In one recent case, a counterfeiter was making bogus half-dollars in his kitchen. When secret service men closed in upon him, he had disposed of his tools and fake coins. But a careful search revealed minute drops of metal under the stove. Gathering several of the tiny globules, detectives put them into the spectrograph and made tests which they compared with the counterfeit coins he had passed. They contained exactly the same proportion of tell-tale impurities, and the case was solved.

### 748. Your Weight Turns on a Light in Dial of Bathroom Scales

8.5-95  
Bathroom scales with a lighted dial are one of the latest household conveniences. When you step on the small, "streamline" platform to be weighed, a tiny bulb shines in the dial, making it easy to read even in a darkened room. Its current is furnished by a small dry battery which is renewable. The scales are neatly designed on modern lines, and are tested for accuracy up to their limit of 300 pounds.

Bearley Co. Rockford Ill

# American and FOREIGN Radio Reception IS YOURS for only \$22.95



## CROSLLEY FIVER

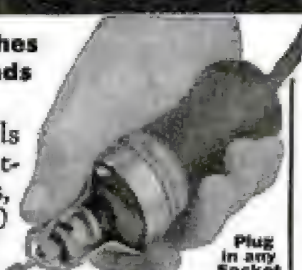
YOU'RE THERE WITH A CROSLLEY

## HANDEE TOOL OF 1001 USES

Grinds - Drills - Cuts - Polishes  
Carves - Routs - Saws - Sands  
Sharpens - Engraves

A whole shop full of tools in one for work on all metals, alloys, bone, resins, glass, stone, wood, etc. Uses 200 accessories. Saves hours of tedious work. 13,000 r.p.m.

A C or D C, 110 volts. \$10.75 and up, postpaid. 3 Accessories Free.



Plug  
in any  
Socket

### DE LUXE MODEL

For constant service, nothing compares with this easy-to-handle production tool. Saves time and labor.

Fastest, smoothest, most powerful tool for its type and weight. 25,000 r.p.m. \$18.50 postpaid. 6 Accessories Free.

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### CRAFTSMAN'S PROJECT BOOK

"Pleasure and Profit with a Handee"  
Easy working plans for making many interesting and unusual projects, 25c stamps or coin.

CHICAGO WHEEL & MFG. CO., 1101 W. Monroe, Dept. Q, CHICAGO

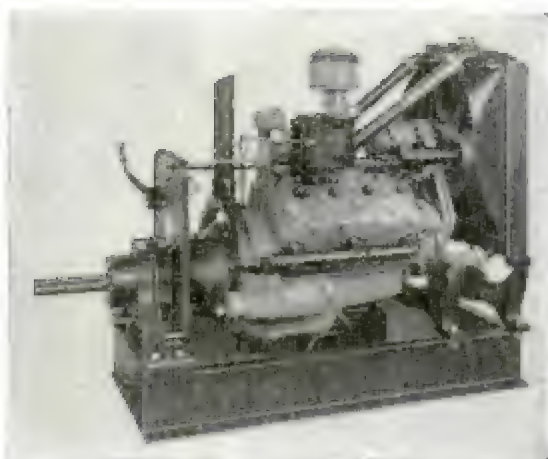
☐ Send Catalog ☐ Project Book  
☐ \$10.75 Model ☐ De Luxe ☐ Send C. O. D. PM-9

Name .....

Address .....



## LOW COST POWER



### with this KRW-FORD V-8 unit

Here's dependable, low-cost power up to 60 H.P.—complete, compact, portable. Ideal for line shafts, welders, compressors, hoists, pumps, amusement devices, well drillers, agricultural, oil field and contractors' equipment, etc., etc. The most complete industrial power plant built. Uses gasoline or natural gas.

Assembled with brand new heavy duty Ford V8 Truck engine. Large capacity radiator protected by heavy screen. Engine rubber mounted—outfit complete with governor, gas tank, 17-plate battery, instruments, etc. Available also completely enclosed with sheet steel housing.

Write for complete information, price, and data showing how this unit will pay for itself out of savings in a few weeks, whether operated on gasoline or natural gas. You can buy thru your Ford Dealer and benefit by local service and low-cost Ford engine replacement feature.

**K. R. WILSON 17 Lock St. BUFFALO, N. Y.**  
EXCLUSIVE BUILDER OF APPROVED FORD SHOP EQUIPMENT SINCE 1916

**DO YOU** WANT a new business profession of your own, with all the trade you can attend to? Then become a foot correctionist, and in a few weeks earn big income in service fees,—not medical nor chiropody—easy terms for home training, no further capital needed, no goods to buy, no agency. Established 1894. Address **Stephenson Laboratory, 1 Back Bay, Boston, Mass.**

## Lower Cost BUILDING MATERIALS



MEN OF FORESIGHT realize the big possibilities today in the building industry. They are aware of the coming shortage. They know the trend for permanent, fire-safe construction at lowest cost.

GET READY TO SUPPLY this demand in your locality. You can build up a complete modern plant from a single machine at \$190.00. INVESTIGATE—Now is the time to get ready. Be prepared to make this extra profit. Write today for Catalog No. 67 and easy payment plan.

CONCRETE EQUIPMENT COMPANY  
512 Ottawa Ave. Holland, Michigan

## Saw-Filing

Pays Up to \$2 or \$3 an Hour  
— Start in Spare time

NO EXPERIENCE NEEDED to file hand, hand and circular saws with FOLEY Automatic Saw Filer, J. W. Anderson, Texas, writes, "My fourth year with Saw Filer and third with FOLEY Lawn Mower Sharpener is a side line. Business has increased until it is about full time."

Used by Leading Saw Makers

Atkins, Dierston, Simonds and by industrial plants and repair shops all over U. S. Cash work. No canvassing. No eye strain. Postcard brings FREE PLAN and special offer of FOLEY Saw Filer free. No obligation.

**FOLEY MFG. CO. 916-7 Foley Bldg.**  
11 Main St., N. E., Minneapolis, Minn.



## Pictures from Sundown to Dawn

(Continued from page 359)

that is long enough to record detail in the shadows. Exposure time? Twenty-five minutes by full moonlight should be given for every  $\frac{1}{100}$  of a second that is needed by sunlight. For example, if the correct exposure by sunlight is  $\frac{1}{25}$  of a second with



Here are the elements of a lovely sunset—clouds, a burst of light and delicate foliage in foreground

stop 16, it will be 100 minutes by moonlight with the same stop. With stop f.11, it will be about sixty-four minutes.

When taking pictures at night remember that the camera must be placed on a tripod or some other firm base, since it is



Street lights or a flash bulb will furnish plenty of light for a snow scene at night

impossible to hold it motionless against the body.

It may take a little time, care and perseverance to produce good night pictures but the results are well worth the effort.

Our Bureau of Information will answer questions regarding articles in this magazine, if accompanied by return postage.



**WHOLESALE CATALOG**  
of 4000 FAST SELLERS

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**SPORS**  
WHOLESALE CATALOG

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260 Pages of World Wide Bargains  
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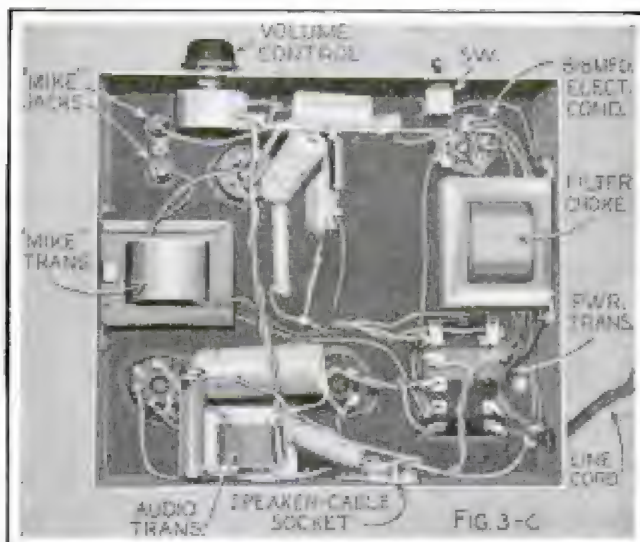
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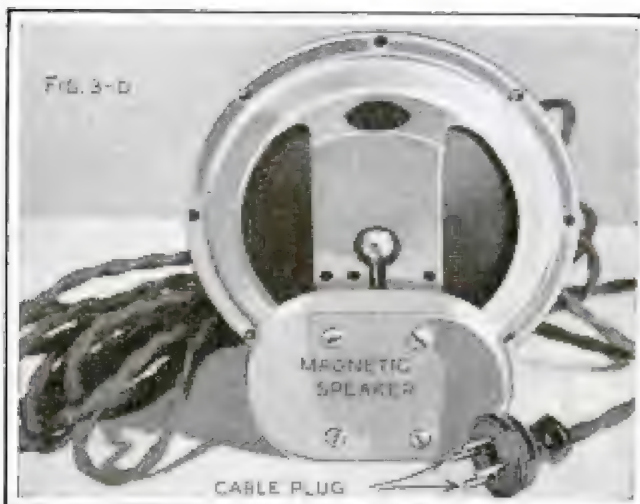
(Continued from page 419)

ondary is 700 volts center-tapped. There is also a 5-volt, 2-amp. winding and a 2½-volt, 1¾-amp. winding. If the 2½-volt winding has a higher amperage rating it will make no difference. The microphone transformer and the filter choke can be



inexpensive unshielded types. A list of the original materials used in the unit may be obtained from Popular Mechanics Magazine radio department, without charge. The blueprint number is R-242.

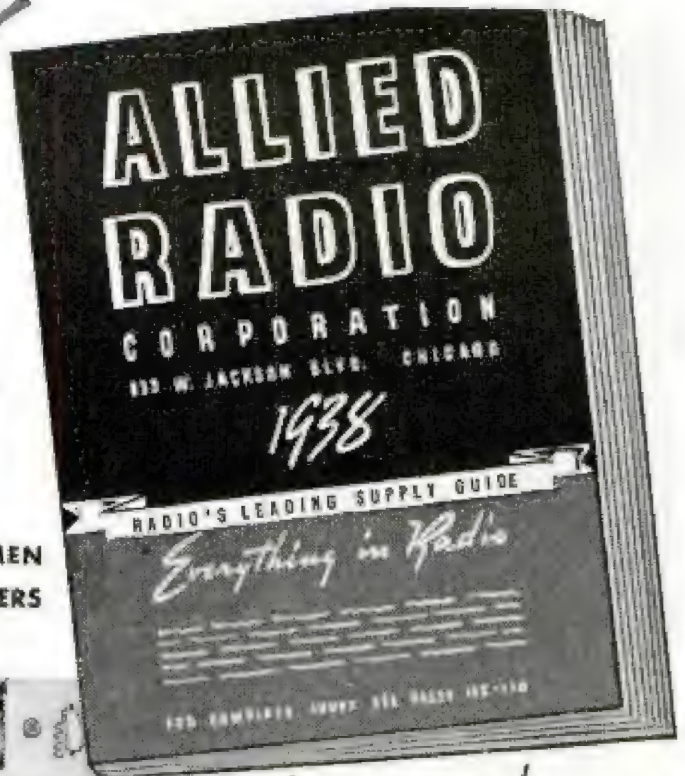
Photos 3-A, 3-B and 3-C show various views of the completed unit. The two-



conductor speaker cable can be any reasonable length. It will be noted in photo 3-D, that the speaker is of the magnetic type, the cable connections being made to the large prongs of the plug and socket. Two or more magnetic speakers may be connected to the cable in parallel, as shown in Fig. 1.



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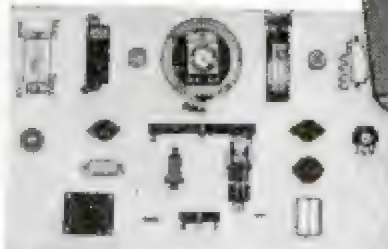
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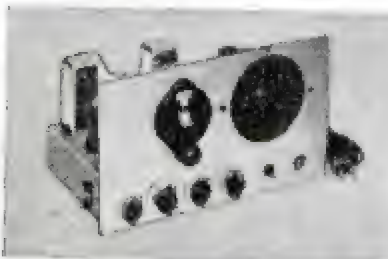
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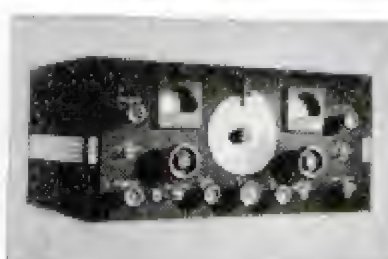
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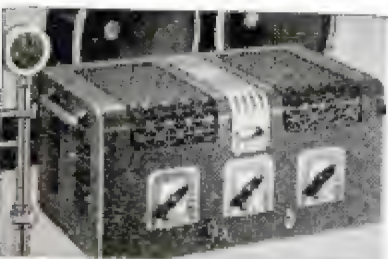
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## Invading a Last Frontier

(Continued from page 342)

miles out from Milwaukee in Lake Michigan to test the Craig-Nohl diving suit and the new 5,000-watt Craig undersea lamp developed especially for Capt. Craig's "Lusitania" salvaging-photographic expedition. We also were making the first broadcast from the bottom of any deep body of water. Station WTMJ, the Milwaukee Journal station, was the point of origin for a coast-to-coast hookup.

Russ Winnie, WTMJ station manager, checked the broadcasting equipment aboard ship. A seven and one-half watt



*Diver in standard helmet ready to be hauled aboard the U. S. "Antietam"*

relay transmitter had been installed. Microphones had been built into the breathing tubes in our helmets and headphones fitted into the skull caps we wore as a part of the diving suit. We had decided to keep all microphones open during the entire broadcast so the two divers under water and the announcer on deck would be in constant communication.

I was hoisted over the side. Knowing I had no life line to foul, one of the improvements, gave me a very comfortable feeling. I carried enough helium and oxygen mixture on my back to remain submerged seventeen hours. Capt. Craig followed me



es 6/8

in a standard diving suit. We were comparing the old and the new.

This test was being broadcast from coast to coast. Every move we made, everything we said would be audible to listeners from San Francisco to Halifax. The watch in my helmet indicated I had been down a little more than fifteen minutes, when I heard Capt. Craig breathing in a far from normal manner. My diving sense told me Capt. Craig was in trouble. I heard Russ Winnie ask "Are you all right, Capt. Craig?" and the tone of his reply was not satisfactory. I made my way through the silt and over the wreckage. Finally, we were side by side, and he pointed to his life line. He told me later he did not want to say anything to alarm his mother, nor his wife, both of whom were listening in. His life line had become fouled. It took only a minute to unfoul him.

We ascended upon orders from the deck of the "Antietam." Capt Craig had been submerged for twenty minutes in a standard diving suit, and was groggy because of the air line fouling. I had been down forty-five minutes in the Craig-Nohl suit and felt no ill effects. Dr. End pronounced me O.K. and we knew our helium-oxygen mixture was practical.

We were at the threshold of a new world, the depths, we were about to cross another frontier; explore worlds long believed safe from invasion.

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The standard diving suit limits vision. Our helmet offers 360-degree or all-round vision. The standard requires a life line to the surface. The Craig-Nohl suit has no life line. It is "self-contained," the diver's air supply being carried in a miniature tank on his back. The superiority of helium-oxygen mixtures over nitrogen-oxygen air mixtures will enable a diver to decompress or come to the top much quicker, sometimes a matter of life and death.

Our experiments have shown that a diver can go to greater depths, remain down longer, be more mobile and come up quicker in the self-contained dress than in the standard dress. Once we have completed our depth and endurance tests, we shall be ready for our next great adventure, the "Lusitania" salvaging-photographic expedition.



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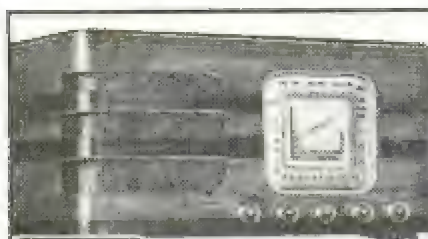
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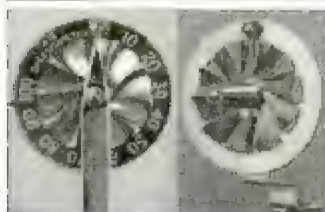
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## High Fidelity Speaker Cabinet

(Continued from page 421)

three panels, one of plywood and two of Celotex. The top and bottom are of  $\frac{3}{4}$ -in. white pine reinforced with two layers of  $\frac{1}{2}$ -in. Celotex. All side, top and bottom pieces project forward to the front surface of the front panel, so that two thicknesses of Celotex separate the front panel from the wood side and horizontal pieces on all sides, thus giving a "floating" construction.

A phantom framework of 2 by 2-in. white pine, with no two pieces touching, is used to obtain necessary stiffness. The panels are fastened to these pieces with  $2\frac{3}{4}$ -in. flat-head wood screws, all screw holes being deeply countersunk and later filled with plastic wood.

After assembly, the front edge of the cabinet is "framed in" with  $\frac{3}{16}$  by 2-in. strip lattice, to cover the exposed ends of the Celotex and plywood panels. Top and bottom are then trimmed with  $\frac{1}{2}$ -in. quarter-round molding, finishing nails being used; nails are forced in with a nailset and holes filled with plastic wood. The loud-speaker aperture is covered with a rectangular piece of tapestry or "grille" cloth held in place by a frame of  $\frac{3}{16}$  by  $\frac{3}{4}$ -in. strips. Mount the speaker on a small shelf fastened to the two vertical 2 by 2-in. supports which are, in turn, screwed to the front panels. The speaker base should be rigidly bolted to the shelf, slotted holes being used to permit sliding the speaker back and forth. Move it tightly up against the Celotex until the felt rim presses firmly against it at all points.

To improve the low as well as the high-frequency response of the cabinet, the speaker is intentionally placed off center. If your speaker does not cover the high range desired, a "tweeter" or high-frequency speaker of the crystal type may be mounted alongside the regular unit on the same level; however, this is not usually necessary if you have a good speaker. This cabinet is for the speaker only, do not place a receiver or amplifier in it.

Celotex strips, 3 in. wide, are nailed to the 2 by 2-in. framework in lattice fashion as shown in the rear-view photo and Fig. 3. These absorb sounds which are reflected from the side walls. Try the cabinet at different points in the room across corners so as to keep it as far away from the wall as possible.



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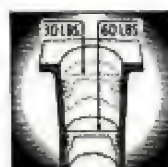
● After 20,000 to 25,000 miles the cylinders in your engine become worn—larger at top than at bottom. (The diagram showing the taper is exaggerated.)



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es 65 3

## Over the "Top of the World"

(Continued from page 323)

remained in the tanks to complete the journey when the fliers suddenly descended at Vancouver on Sunday morning, slightly more than sixty-three hours after the take-off. And even though they failed to reach their announced destination, the fliers may consider their job well done because they had reached established air routes before coming to earth. The hard part had been accomplished.

About a month earlier eleven Soviet aviators landed on an ice floe about twelve miles from the North Pole. The expedition was headed by Professor Otto J. Schmidt, director of Russia's "northern sea route." Taking off from Rudolf Island, on which an aerial base had been set up after extensive survey flying, the party crossed over Arctic wastes in a heavily loaded four-motored plane resembling Russia's bombing aircraft and landed on the ice floe a few hours later after a 550-mile flight. Before landing the party circled the pole many times looking for a spot on which their plane might descend safely.

This flight was hailed around the world as a major step in the Soviet plan to establish the Moscow-San Francisco line.

Other planes, bearing supplies, a lightweight fur-lined house and weather observation instruments, followed from Rudolf Island within a short time and soon an observation station had been set up on an ice floe. Then the planes flew away, leaving four men and a dog in that frozen land, the men to collect and report weather data and the dog to warn the men of the approach of polar bears. For twelve months this small group will remain at their isolated station to carry on their work, paving the way for the air line. At the same time their radio reports of temperature and air conditions at that point may be highly valuable to weather bureaus in many countries, since science long has held the theory that the weather is "made" at the "top of the world."

Russian scientists contend that there is a warm layer of air slightly more than one mile above the Arctic wastes. Should this be found true, high-flying air liners would not be subjected to the extremely low temperature which created a hazard for the three pioneers on their non-stop dash.

(Continued to page 150A)



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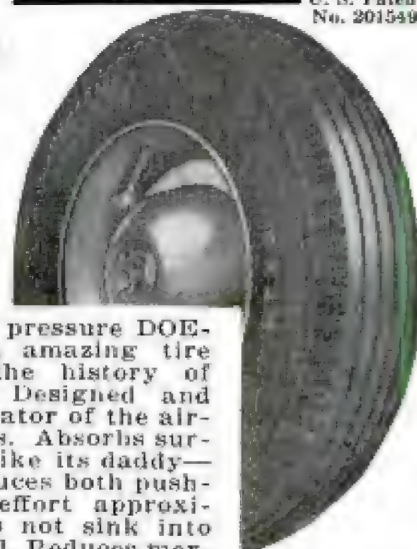
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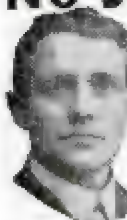
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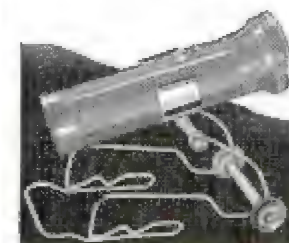
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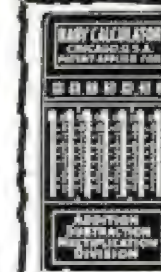


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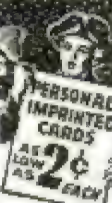
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es 653 *used, see attached*

(Continued from page 148A)

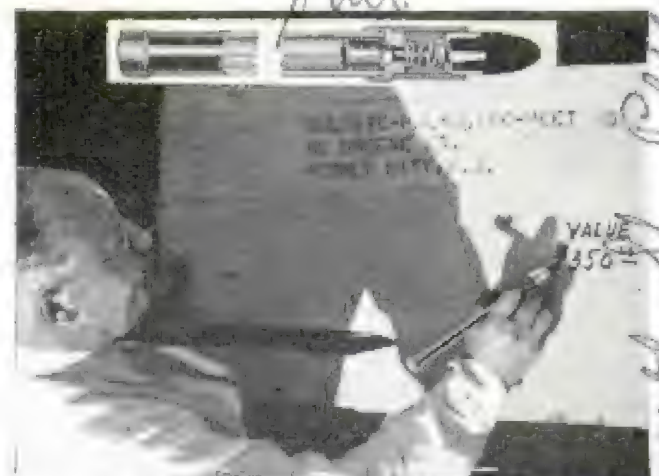
South of the North Pole, these fliers reported, heavy ice formed on the windows of their plane. It was so thick that visibility was zero. In strange contrast, no ice formed on the wings of the ship. By putting more resistance into the plane's heating coil, the Russians raised the temperature of the interior quickly, causing the ice to melt. The water supply in the plane froze solid.

When an ice breaker crashed through the frozen waters of the Arctic to Rudolf Island with equipment several months previously, the first step to conquest of the pole was accomplished. Seventeen men spent the winter there, studying weather conditions and preparing a takeoff field. The actual move toward the North Pole began on March 23, when P. G. Golovin and three companions took off from Moscow on an announced flight to Rudolf by way of Archangel, Naryan-Mar, Amderma and Cape Desire on a survey trip. Next the bomber-like plane in which the polar party landed on the ice, with other aircraft, reached Rudolf Island and shortly afterward came the successful flight along the fifty-eighth meridian to the pole.

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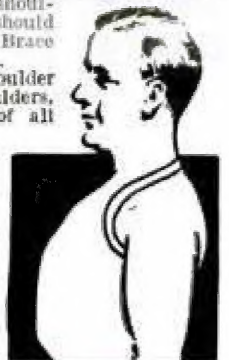
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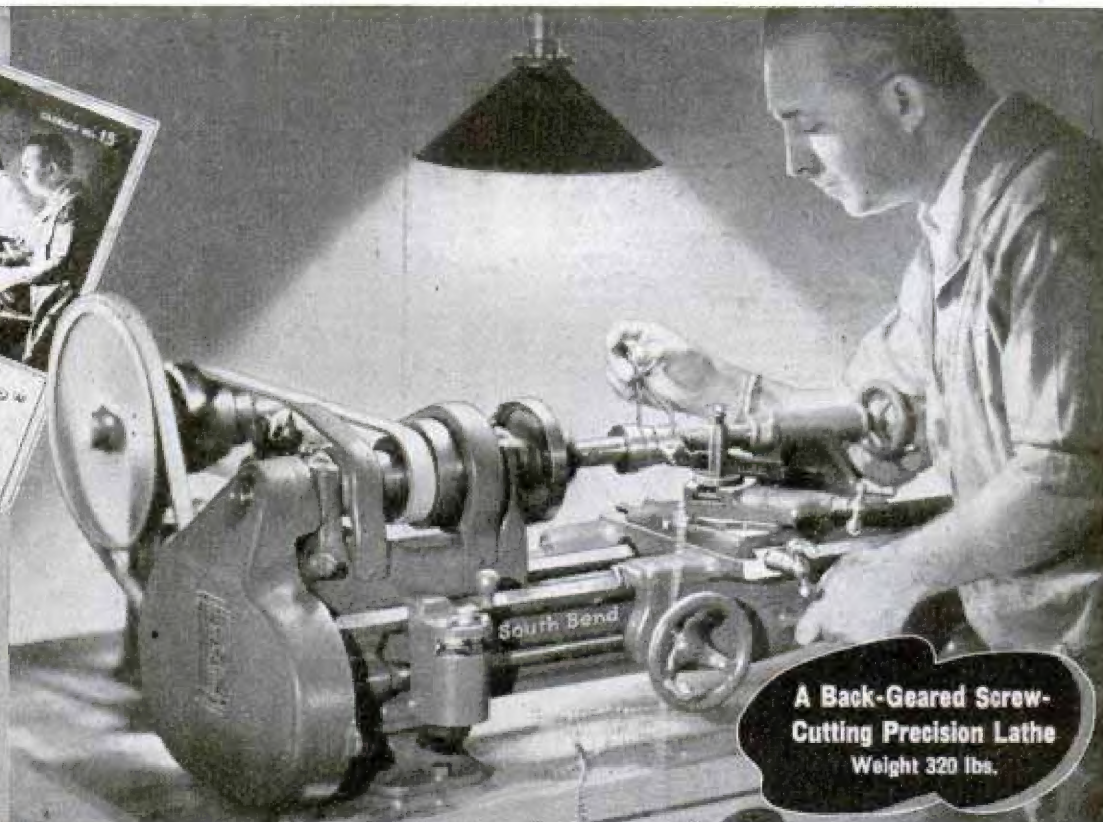
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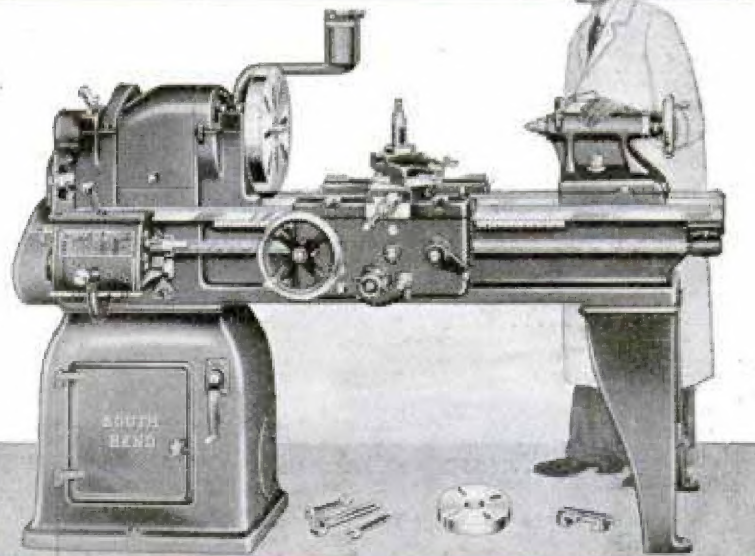
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South Bend, Ind., U.S.A.

Please send the following free, postpaid:

- ☐ 9" Workshop Lathe Catalog No. 15-U.  
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**SOUTH BEND Precision LATHES**



PERFECTED ELECTRIC TUNING—  
JUST TOUCH BUTTONS

AUTOMATICALLY STOPS  
"SMACK" ON THE STATION

MAGIC MOVIE  
OVERSEAS DIAL

NO MORE DIAL TWIDDLING—  
ELECTRICALLY AUTOMATIC

9 TOUCH BUTTONS BRING IN  
9 STATIONS—IN A FLASH!

# JUST TOUCH BUTTONS

*Stations Zip In...  
With Midwest 20-Tube  
ELECTRIC TUNING!*

**ONLY MIDWEST'S DIRECT-FROM-FACTORY  
POLICY MAKES THIS AND OTHER SENSATIONAL  
FEATURES POSSIBLE AT AMAZINGLY LOW PRICES!**

**30 DAYS  
FREE  
TRIAL**

HERE'S today's radio sensation! No more dial twiddling—no more squinting—no more stooping when you tune a radio! Just touch an electric button (on top of radio) and its corresponding station zips in . . . and the dial stops ITSELF Automatically on the station. All this happens in one second with Midwest Perfected ELECTRIC Tuning: (1) You touch button—electric motor speeds dial towards corresponding station; (2) Colorful Bull's Eye darts across dial and locates itself behind station; (3) As dial flashes to station, it "hunts" back and forth for an instant—and stops itself at exact center of resonance. Zip . . . Zip . . . Zip . . . you bring in 9 perfectly tuned stations in 7 seconds!

Why be content with an ordinary 10, 12 or 14-tube set, when you can buy a 20-tube Super DeLuxe ELECTRIC TUNING Midwest for the same money! It will surprise and delight you with its brilliant world-wide reception on 6 bands. You save 50%—and get 30 days free trial in your own home—when you buy direct from the factory at wholesale prices. You are triply protected with Foreign Reception Guarantee, One-Year Warranty and Money-Back Guarantees.

**TERMS AS LOW AS \$1.00 A WEEK**

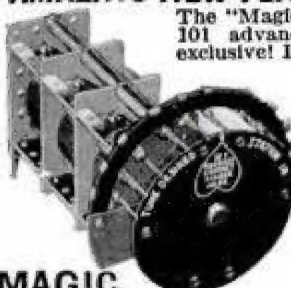
You have a whole year to pay for your Midwest on the easiest and most convenient of credit terms.

Only \$**49.95**

**FACTORY-TO-YOU  
NEW LOW BASE  
PRICE CHASSIS**



## AMAZING NEW FEATURES GIVE HUMAN PERFORMANCE

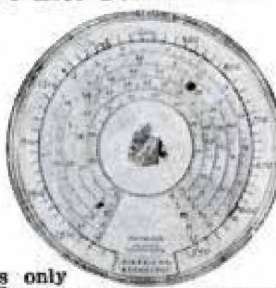


**MAGIC  
MYSTIC BRAIN**

The "Magic Mystic Brain" is just one of 101 advanced features, many of them exclusive! It interprets your touch button signals and controls the electric motor. Nine contact fingers can be easily set to any stations you desire. Even a child can do it!

### MAGIC MOVIE DIAL

Now, you can delight in the world's finest six-continent overseas reception with a range of 12,000 and more miles (125 to 20,000 KC). Note that chassis dial shows only broadcast band. Then, flip 6-wave band switch, and, instantly, 5 additional bands are projected on dial.



### SEND FOR FREE 40-PAGE CATALOG

See for yourself that Midwest offers today's greatest radio values! Write for new 1938 Factory-To-You Catalog showing 40 pages of radios, chassis and features—in their natural colors. Select the one you like on 30 days FREE TRIAL in your own home.

**[Service Men! Join nation-wide Midwest service organization. Write for free details.]**



# MIDWEST

**WORLD-WIDE RADIOS**

**MIDWEST RADIO CORPORATION  
DEPT. BB-15 CINCINNATI, OHIO, U.S.A.**

**MIDWEST RADIO CORPORATION**  
Dept. BB15 Cincinnati, O.  
Send me your new FREE catalog and complete details of your liberal 30-day FREE trial offer.  
(Special offer and prices prevail only when dealing direct with factory by mail.)

Name.....  
Address.....  
Town.....State.....

( ) Check here for 24-page BATTERY catalog

User-Agents Make Easy Extra Money. Check Here ☐ for details.

**PASTE COUPON ON 1¢ POSTCARD...OR WRITE TODAY.**





# fun?

## SURE IT IS

*—and mighty strenuous too!*



"SPORT, even for the fun of it, can be tense and tiring," says Miss Gloria Wheeden, who is shown aquaplaning above and at left. "Like most of the folks who go in for water sports, I pride myself on my physical condition. Yes, I smoke. When I feel a bit let-down, I light up a Camel and get a 'lift' in energy." When an active day drains physical and nervous energy, Camels help you renew your flow of vim. And being mild, they never get on your nerves.



"MANY A TIME I've smoked a Camel to get a 'lift,'" says Harry Burmester printer, (left). "With Camels handy, I feel I can take the tough spots right in stride. Camels never tire my taste or irritate my throat—even smoking as much as I do."



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R. J. Reynolds Tobacco Company  
Winston-Salem, N. C.

### COSTLIER TOBACCOS

Camels are made from finer, MORE EXPENSIVE TOBACCOS—Turkish and Domestic—than any other popular brand.

**1060 PARACHUTE JUMPS**—no mishaps! Floyd Stimson (right) started smoking Camels at his first parachute jump. "Camels are so mild I take healthy nerves for granted," says Floyd. "I've found what I want in Camels. Mildness — tastiness."



*Get a Lift with a Camel!*